



**ERNEST ORLANDO LAWRENCE  
BERKELEY NATIONAL LABORATORY**

**ENVIRONMENT, SAFETY, AND  
HEALTH  
SELF-ASSESSMENT REPORT  
FISCAL YEAR 2005**

Office of Contract Assurance  
Laboratory Directorate  
October 2005

This report was prepared for the U.S. Department of Energy in accordance with section 4(d)2 of the Contract No. DE-AC02-05CH11231 proposal.



---

## Table of Contents

Executive Summary .....	1
Introduction .....	3
Division Self-Assessments .....	5
<i>ISM Core Function 1: Define Work</i> .....	5
<i>ISM Core Function 2: Identify and Analyze Hazards</i> .....	6
<i>ISM Core Function 3: Control Hazards</i> .....	6
<i>ISM Core Function 4: Perform Work</i> .....	8
<i>ISM Core Function 5: Feedback and Improvement</i> .....	10
Integrated Functional Appraisals (IFA) .....	12
Safety Review Committee Management of ES&H (MESH) Reviews .....	14
ES&H Improvements.....	16
<i>Status of FY04 Self-Assessment Corrective Actions</i> .....	16
<i>FY05 Recommendations for Institutional Improvements</i> .....	17
 <b>APPENDICES</b>	
Appendix A. FY05 Division Self-Assessment Performance Criteria.....	A-1
Appendix B. FY05 Division Self-Assessment Performance Ratings.....	B-1
Appendix C. FY05 Self-Assessment Noteworthy Practices and Opportunities for Improvement .....	C-1
Appendix D. List of Acronyms and Abbreviations .....	D-1

# Executive Summary

Lawrence Berkeley National Laboratory (LBNL) is composed of 16 separate divisions and directorates for Environment, Safety, and Health (ES&H) Self-Assessment. Through division self-assessments as well as Integrated Functional Appraisals (IFAs) and Management of ES&H (MESH) reviews, all divisions sufficiently demonstrated that they have fully implemented and maintained robust integrated safety management (ISM) systems.

All divisions participate in the annual Division Self-Assessment. The divisions regularly integrate ES&H considerations into work planning, actively identify and analyze hazards, and effectively control these hazards through administrative and engineering means. LBNL staff performs work safely, and ES&H feedback and improvement mechanisms are robust. The Laboratory's overall performance in fiscal year (FY) 2005 declined slightly from 2004. This is due primarily to two developments: (1) there were difficulties in storing hazardous, radioactive, and mixed waste in compliance with regulatory requirements, and (2) several divisions struggled to meet the aggressive new ergonomic standards established through the FY 2005 self-assessment performance measures.

Five divisions received IFAs this fiscal year: Accelerator and Fusion Research (AFRD), the Advanced Light Source (ALS), Earth Sciences (ESD), Facilities, and Nuclear Science (NSD). The 2005 IFAs concluded that, in all five divisions, all operations requiring formal authorizations have the appropriate authorizations. In addition, the requirements established in these authorizations are diligently followed.

The LBNL Safety Review Committee (SRC) performed MESH reviews in five divisions this year: Computing Sciences; the Directorate/Operations; Environment, Health, and Safety (EH&S); Genomics; and Life Sciences (LSD). The MESH reviews determined that ISM plans are effectively implemented in all five divisions. In addition, all five divisions have strong management support and robust ES&H communications. Divisions are also highly responsive to deficiencies identified during inspections and appraisals.

The performance-year 2005 self-assessment process noted deficiencies that should be addressed institutionally. These opportunities for improvement are:

- **Hazard, Equipment, and Authorization (HEAR) database.** This is an important hazard identification and control tool developed by the EH&S Division for use across the institution. However, some divisions do not fully utilize this tool because of difficulties in use and failure to understand the benefits of the database.
- **Communication of the UC/LBNL Memorandum of Understanding (MOU).** The UC/LBNL MOU was signed in early 2004, but divisions remain uncertain of their responsibilities for the ES&H conditions of staff in UC Appendix I workspaces.
- **EH&S Database Support of Ergonomic Evaluations.** The EH&S Training Database and Ergonomics Database are vital tools for aiding divisions in requesting and completing ergonomic evaluations. However, the databases inconsistently maintain records of evaluations, and inefficiently facilitate evaluations.
- **Satellite Accumulation Area (SAA) Compliance.** Divisions are not storing hazardous, radioactive, and mixed waste as vigilantly as they have in the past few years. The

Laboratory must refocus efforts to ensure waste is stored compliantly at generator locations.

# Introduction

LBNL's ES&H Self-Assessment Program ensures that ISM is implemented institutionally and by all divisions. The Self-Assessment Program, managed by the Office of Contract Assurance (OCA), provides for an internal evaluation of all ES&H programs and systems at LBNL. The functions of the program are to ensure that work is conducted safely and with minimal negative impact to workers, the public, and the environment. The program is composed of four distinct assessments: the Division Self-Assessment, IFA, the MESH review, and the Appendix B Self-Assessment.

The Division Self-Assessment uses the five core functions and seven guiding principles of ISM as the basis of evaluation. Metrics are created to measure performance in fulfilling ISM core functions and guiding principles as well as promoting compliance with applicable regulations.

The five core functions of ISM are as follows:

1. Define the Scope of Work
2. Identify and Analyze Hazards
3. Control the Hazards
4. Perform the Work
5. Feedback and Improvement

The seven guiding principles of ISM are as follows:

1. Line Management Responsibility for ES&H
2. Clear Roles and Responsibilities
3. Competence Commensurate with Responsibilities
4. Balanced Priorities
5. Identification of EH&S Standards and Requirements
6. Hazard Controls Tailored to the Work Performed
7. Operations Authorization

Performance indicators are developed by consensus with OCA, division representatives, and EH&S Division program managers. Line management of each division performs the Division Self-Assessment annually. The focus of the review is workplace safety.

The IFA is an in-depth ES&H technical review of division work activities and operations. The focus of the IFA is on higher-hazard work, particularly work requiring formal authorizations. The assessment concentrates on adequacy of authorizations, effective control of hazards, balance of operation and safety priorities, and applicability of institutional standards and regulatory requirements. The IFA is conducted by EH&S Division technical experts. Each division receives an IFA triennially.

The MESH review is an evaluation of division management of ES&H in its research and operations, focusing on implementation and effectiveness of the division's ISM plan. It is a peer review performed by members of the LBNL SRC, with staff support from OCA. The SRC

includes representatives of each science and operations division at LBNL. Each division receives a MESH review every two to four years, depending on the results of the previous review.

Information obtained from the Division Self-Assessments, IFAs, and MESH reviews address performance requirements in the UC/DOE Contract 31, Appendix B Self-Assessment. The Appendix B, Performance Objective Criteria and Measures (POCM) require that the Laboratory sustains and enhances the effectiveness of integrated safety, health, and environmental protection through a strong and well-deployed system. As the Division Self-Assessment assesses the implementation of each division's integrated ES&H system, this information is used in the Appendix B assessment. Additional information required for Appendix B is provided by EH&S Division functional managers. The annual Appendix B Report is submitted at the close of the fiscal year. This assessment is the DOE's primary mechanism for evaluating the Laboratory's contract performance in ISM.

Throughout the following discussion, the following abbreviations are used for certain LBNL divisions: AFRD (Accelerator and Fusion Research Division), ALS (Advanced Light Source), CSD (Chemical Sciences Division), EETD (Environmental Energy Technologies Division), EH&S (Environment, Health, and Safety Division), ESD (Earth Sciences Division), LSD (Life Sciences Division), MSD (Material Sciences Division), NSD (Nuclear Science Division), and PBD (Physical Biosciences Division).

# Division Self-Assessments

## Performance Rating

Each division's ES&H performance rating is based on a color-coded system of determining whether each performance criterion and expectation is fully met, partially met, or marginally met. Points are assigned for the three performance gradients, and a percent performance is calculated for each performance indicator and for overall division performance. A green rating, which means division performance is within the range of excellent to outstanding for an expectation, is worth three points. A division is assigned two points for a yellow rating, which means it is partially meeting performance requirements for the metric. A red rating, which is worth one point, communicates that a division's performance is marginal for a performance indicator. Finally, a gray rating denotes that a performance metric is not applicable to the division. Rating determinations for each performance metric are detailed in Appendix B.

## Performance Results

The Division Self-Assessment performance criteria and expectations are used to evaluate the effectiveness of each division's ISM program. ISM provides the foundation for the divisions' ES&H programs. Each division performs self-assessment activities throughout the performance year. At the end of the performance year, each division prepares a report that summarizes these activities and appraises their ES&H performance. OCA reviews these reports and validates the division performance in meetings with division and DOE representatives.

## ISM Core Function 1: Define Work

All divisions effectively communicate ES&H issues with staff. Divisions employ several methodologies to ensure that this communication is a two-way exchange between management and staff. The most common form of communication is the division safety committee. Most divisions have active safety committees that include managers, but management also communicates safety policies with staff through other means as well. Several divisions held town-hall or all-hands meetings that included safety on the agendas. Some divisions also periodically include safety on the agendas of regular senior management meetings. This gives safety coordinators an opportunity to discuss safety issues with senior management and to also address their concerns. Group meetings that include safety topics are also a popular method of engaging staff.

As safety committees are a primary ES&H communication mechanism in each division, divisions should ensure that the committees have charters that detail members' roles and responsibilities in communicating relevant information to the staff they represent. Divisions should also carefully review committee membership to ensure that all division staff are represented.

All divisions performed environmental performance reviews for selected new and existing work. In most cases, divisions focused on minimizing the generation of hazardous and radioactive waste. Life Sciences is pursuing the purchase of two imaging devices that do not use radioactive or hazardous chemicals, which will significantly reduce waste generation.

Divisions also pursued resource-conservation opportunities in reviewing their environmental performance. For example, Facilities has installed a chemical-free water cooling system for buildings 62 and 66, and is considering a similar installation for Building 37. Besides reducing chemical waste, these systems will substantially reduce wastewater. Several divisions focused on improving their recycling efforts, especially recycling and reducing paper usage.

Some divisions have instituted programmatic solutions to facilitate environmental performance reviews. Physics and Engineering have each implemented an environmental performance review in their proposal process for new and renewed work. Other divisions used their internal self-assessment checklists to solicit suggestions for reducing waste and conserving resources.

## **ISM Core Function 2: Identify and Analyze Hazards**

All divisions inspected nearly 100% of their staff workspaces during the course of the self-assessment year. Using self-assessment teams to perform inspections is the most common method that divisions use to ensure all workspaces are inspected. Another popular form of inspection partners safety coordinators with principal investigators and group leaders to inspect their respective staff workspaces. Physical Biosciences has an aggressive inspection program that requires all staff to inspect their personal workspaces.

Most divisions document their hazards and environmental impacts inherent in their work in the institutional Hazard, Equipment, and Authorization Review (HEAR) database. A few divisions do not use the HEAR database but instead document hazards in workspace or project hazard review forms. Earth Sciences also uses another form, an Off-Site Safety and Environmental Protection Plan (OSSEPP) to account for hazards encountered during fieldwork.

Some divisions are still struggling with ES&H requirements in Appendix I space on the UC Berkeley campus. Although the memorandum of understanding (MOU) was signed by LBNL and UC in early calendar year 2004, divisions are still unsure of their responsibilities regarding training, inspections, and ES&H communications for their staffs working in Appendix I spaces.

## **ISM Core Function 3: Control Hazards**

Divisions ensure that engineering controls are in place and maintained. Most divisions check engineering controls during self-assessment inspections. Managers also check engineering controls during routine work and inspections. As part of their all-hands inspection program, Physical Biosciences asked all employees to check this year's designated hazard controls, eyewashes and safety showers.

Divisions are controlling hazards administratively through formal authorizations and self-authorizations. All formal authorizations were reviewed as required. Self-authorized work was controlled through various means. Laboratory facilities, such as the ALS, PGF, and the 88-Inch Cyclotron, use operating procedures and protocols in their work. The Facilities Division has developed hazard evaluation procedures for staff responding to smaller jobs assigned through the Work Request Center.

Other divisions use self-assessment and management inspections to review self-authorized work. Most divisions use the HEAR database to document the control of self-authorized work, although some divisions use project and space safety reviews to perform this function. Recording and reviewing self-authorized work in National Environmental Policy Act/California Environmental Quality Act (NEPA/CEQA) documents is another form of self-authorization employed by a few divisions.

The EH&S Division should partner with Berkeley Lab's divisions to update the HEAR database for all Laboratory workspaces. This process will have many benefits: (1) the database effectively documents that lower-level routine workspace hazards are identified and appropriately controlled; (2) a current, institutional hazard inventory is an asset to emergency response operations, and (3) as the Facilities Division operations database (Maximo) interfaces with HEAR, a current HEAR inventory provides Facilities staff with accurate knowledge of hazards when entering workspaces across the Laboratory. Accurate information from HEAR can help prevent Facilities staff from entering workspaces that requires additional authorization (e.g., radiological materials areas and laser labs).

Divisions continue to focus on ergonomic hazards. These are addressed in several ways, most commonly through training, ergonomic workstation evaluations, and implementing corrective actions resulting from the evaluations. Divisions also consider conditions of workspaces during self-assessment walk-throughs. Several divisions were extremely diligent in completing staff training and evaluations. Over 700 evaluations were completed Laboratory-wide during the performance year. Most notably, the Directorate performed 264 evaluations. The Directorate is very focused on ergonomics, as this is the most significant hazard to its staff. Recognizing this, the Directorate has developed work protocols that include micro-breaks and task sharing to address repetitive motion injuries.

Some divisions must more diligently implement measures to mitigate ergonomic hazards. Three divisions, Material Sciences, Life Sciences, and Physics, trained less than 90 percent of staff required to complete ergonomic training. Three divisions, Materials Sciences, Engineering, and Chemical Sciences, had several requested ergonomic evaluations that were not completed.

Several divisions address ergonomic hazards outside of computer workstations. Facilities evaluated the rack system at Building 79, and redesigned the system to address ergonomic hazards. Physics also reviewed several lifting tasks for ergonomic hazards. EH&S and Facilities require all staff who perform physical labor to complete MoveSmart training. Science divisions, notably Life Sciences, Nuclear Sciences, Physical Biosciences, and Physics, have implemented ergonomic improvements to routine laboratory work, such as using ergonomic pipettes.

Divisions effectively addressed chemical hazards by maintaining their chemical inventories and ensuring that peroxide chemicals were tested as required.

## **ISM Core Function 4: Perform Work**

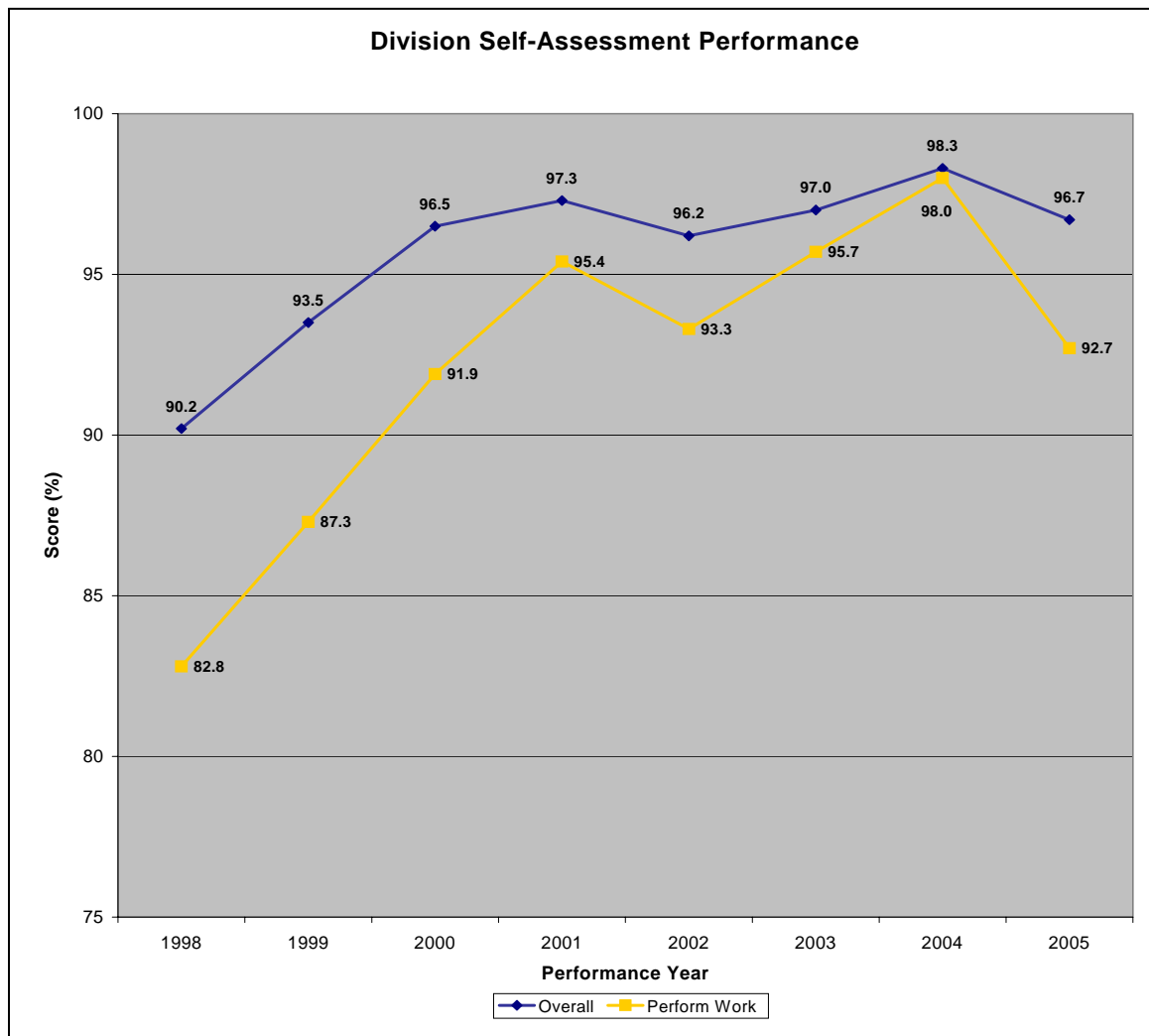
The Laboratory-wide results in the Perform Work metrics declined precipitously this year, as compared to the 2003 and 2004 performance years. This is primarily due to a decline in waste management performance from previous years.

The EH&S Division Waste Management Group issued a total of six Nonconformance and Corrective Action Reports (NCAR) to five divisions this year. This is a significant increase from 2003 and 2004, when only one NCAR was issued in each respective year. As a result, the

Laboratory-wide NCAR score was an aggregate 76.2%; in 2003, the score was 94.9%; in 2004, 95.2%.

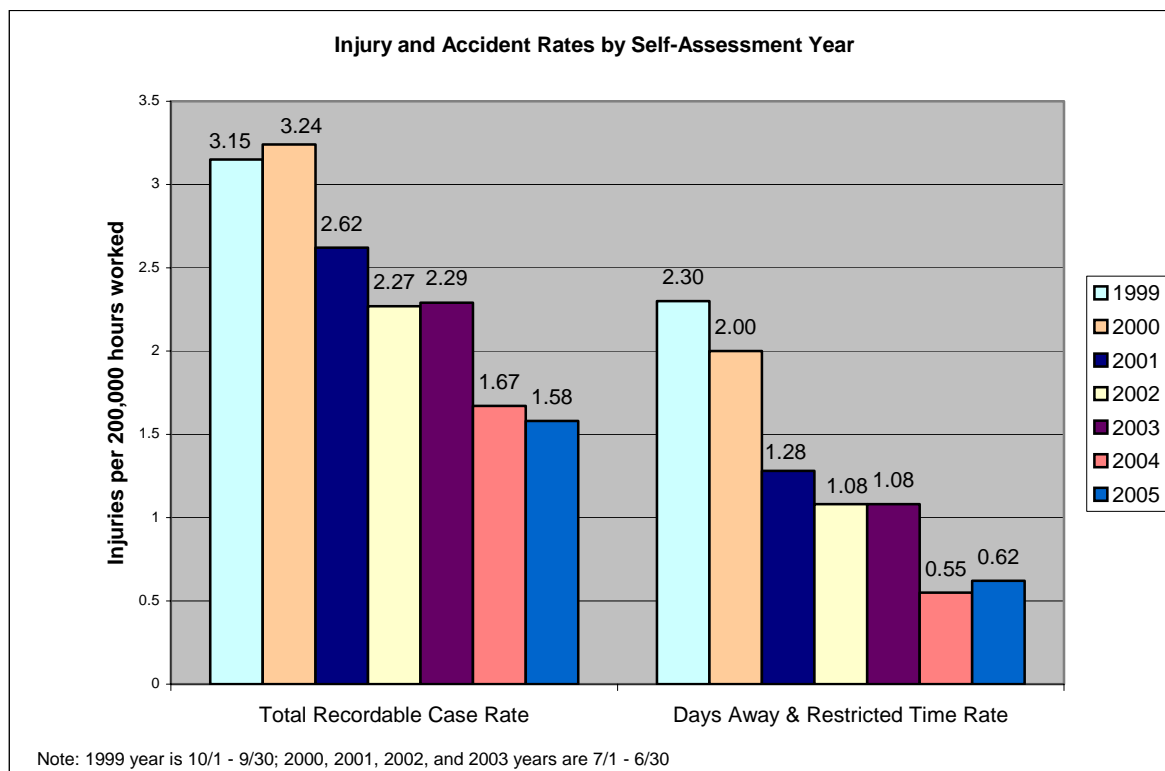
Satellite accumulation area (SAA) compliance also decreased this year compared to recent years. In 2003 and 2004, all divisions met the 90% SAA compliance threshold required for a satisfactory (green) rating. In 2005, three divisions did not meet the 90% compliance threshold. In fact, only 75% of AFRD's SAAs were in compliance, which merited a marginal (red) rating. As a result, the Laboratory-wide composite score for the SAA compliance metric decreased from 100% in 2003 and 2004 to 90.5% in 2005.

Recognizing that past SAA inspections were not sufficiently rigorous, Berkeley Lab assigned SAA inspection duties to OCA in 2005. These inspections removed the conflict of interest of Waste Management Group specialists inspecting their client divisions, and ensured that inspections were performed to the strictest interpretation of state regulations. As a result, Laboratory-wide SAA compliance decreased from 95.7% in 2004 to 91.0% in 2005; however, the increased emphasis placed on SAA compliance should improve future performance in all divisions.



The decrease in the Laboratory-wide Perform Work score to 92.7% drove down the overall 2005 Self-Assessment score to 96.7%. This is the lowest overall score since 2002. This drop demonstrates that divisions' ES&H performance has been functioning at a very high level for several years, as slippage in any key area significantly affects the overall Laboratory-wide score.

Injury and accident rates were not evaluated at the divisional level during the 2005 performance year. The 2005 self-assessment Laboratory-wide total recordable case (TRC) rate is 1.58, continuing a downward trend established since 2000. The 2005 self-assessment TRC rate is the lowest on record, surpassing the 2004 self-assessment rate of 1.67. Three divisions—AFRD, Physical Biosciences, and Physics—had no recordable staff injuries this year. For AFRD, this is the fifth straight year with no recordable injuries and accidents.



The 2005 days away and restricted time (DART) rate is 0.62, a slight increase from the 2004 self-assessment DART rate of 0.55. The 2005 self-assessment DART rate is the second lowest on record. Accelerator and Fusion Research, Chemical Sciences, Earth Sciences, Life Sciences, Materials Sciences, Nuclear Science, Physical Biosciences, and Physics divisions had zero DART cases in the 2005 self-assessment year.

The Laboratory had six Level 2 (major) radiological work authorization (RWA) violations in 2005. This is a slight increase from the 2004 self-assessment year, when five Level 2 violations were recorded. Berkeley Lab also had two environmental violations or unplanned releases during 2005.

## ISM Core Function 5: Feedback and Improvement

Managers and staff in all divisions are involved in ES&H feedback and improvement opportunities. Managers participate in division safety committees, workspace inspections, and accident review boards. While senior managers are very involved in ES&H activities, middle management is not as active in several divisions. Line and middle managers are the best resources to ensure that safety conditions remain sound in Laboratory workspaces. For example, while Genomics line managers participate in annual walk-throughs, they do not consider workspace hazards during routine operations. As a result, safety conditions can deteriorate during the year.

Most divisions are effectively tracking and resolving safety deficiencies. Only AFRD, Nuclear Sciences, and Physics are not resolving findings at a 90 percent completion rate. AFRD

is very proactive in identifying and tracking safety deficiencies, recording over 200 findings in the 2005 performance year, but it has historically struggled with resolving these findings. To address this tendency, AFRD is adding Laboratory Corrective Action Tracking System (LCATS) completion as an expectation in all employee performance reviews for 2006. Besides AFRD, ALS, Engineering, Environmental Energy Technologies, Facilities, Material Sciences, and Physical Biosciences divisions all recorded well over 100 safety deficiencies in 2005. These practices significantly improve workspace safety.

Divisions are effectively addressing opportunities for improvement identified from the 2004 self-assessment period. Programmatic findings from MESH reviews, integrated functional appraisals, and division self-assessments are tracked in LCATS to resolution. A few divisions did not effectively track these findings in LCATS but demonstrated that the deficiencies were resolved. Divisions should use the institutional corrective action tracking system to document closure of these findings, as LCATS facilitates accountability, timely closure, and effective reporting of corrective actions. Computing Sciences and Facilities did not effectively address all opportunities for improvement from the 2004 self-assessment but were actively implementing corrective actions during early performance-year 2006.

All divisions are diligent in reviewing the injury and accident reports. With few exceptions, root causes are effectively identified, and corrective actions are implemented. In most divisions, management participates in accident reviews, either through accident review board meetings or direct discussion with the injured staff and responsible supervisors.

## Integrated Functional Appraisals (IFAs)

IFAs evaluate higher-hazard and complex operations that demand subject matter expertise from the EH&S Division. A focus of the IFA is authorization compliance. The following divisions received an IFA during fiscal year 2005:

<u>Division</u>	<u>IFA date</u>
Accelerator and Fusion Research	September 2005
Advanced Light Source	June 2005
Earth Sciences	September 2005
Facilities	September 2005
Nuclear Science	June 2005

### IFA Results

IFAs performed in 2005 concluded that all operations requiring formal authorizations have the appropriate and current formal authorizations. These authorizations are conscientiously followed. Each division's management expressed strong support for ES&H. This results in regular workspace inspections and safety-conscious staffs. Workspaces are generally well maintained. Noteworthy practices and opportunities for improvement for each of the five assessed divisions are listed in Appendix C.

Common noteworthy practices from the five IFAs are as follows:

1. The four appraised research divisions demonstrate excellent integration of safety at the benchtop level. NSD uses project/facility safety review questionnaires, electrical hazard risk analyses, and on-the-job-training (OJT) checklists to ensure that researchers and staff are cognizant of lab hazards and are trained to the specific hazards. AFRD is particularly strong in developing procedures and safeguards for its experimental apparatus. These include guarding and shielding of lab equipment, interlock systems, lockout/tagout procedures, and experiment-specific training requirements. The ALS has allocated significant ES&H resources to its operations, including a full-time ES&H coordinator and radiological control technician, and a part-time ES&H administrator. More importantly, these ES&H professionals function seamlessly as part of the day-to-day operation. Earth Sciences requires all labs to have a work-specific Lab Safety Primer; Division management conducts frequent oversight inspections to ensure that the primers address all aspects of safety for that particular lab.
2. The one nonresearch division appraised, Facilities, has been aggressive and proactive in its accident prevention program, particularly in improving ergonomics, maintaining

good storage and housekeeping practices, and utilizing personal protective equipment whenever possible.

3. All appraised divisions have excellent management commitment for safety, as demonstrated by the resources allocated, and the full integration of safety into their operations and work activities.

Opportunities for improvement identified from the IFAs include the following:

1. The lack of space, resulting in some instances of clutter and overcrowding, continues to be a challenge for the Laboratory. Lack of space continues to be an institutional problem and requires long-term planning and funding by Berkeley Lab management.
2. Despite recent awareness of electrical hazards at the Laboratory, electrical deficiencies are a significant concern in several of the appraised divisions. Not following electrical safety procedures and poorly protected or maintained electrical equipment are some of the causal factors for recent electrical hazard incidents.
3. Better documentation of hazard identification, safety reviews, and training is a concern for one division.
4. Machine guarding of equipment and heating, ventilating, and air-conditioning (HVAC) components can be improved in two of the divisions appraised. The divisions' inspection programs should increase their vigilance in this area.

## Safety Review Committee (SRC) Management of ES&H (MESH) Reviews

The SRC conducts reviews of each division's MESH in operations and/or research, focusing on the implementation and effectiveness of each division's ISM Plan. For fiscal year 2005 (FY05), the SRC conducted MESH reviews in the following divisions:

<u>Division</u>	<u>MESH Review Date</u>
Life Sciences	June 2005
Computing Sciences	August 2005
Environment, Health, and Safety	August 2005
Genomics	September 2005
Directorate	October 2005

The MESH reviews determined that all divisions have adequate division ISM plans that are effectively implemented. Management commitment is vital in all divisions, with senior managers who regularly participate in the following safety activities: communications, committee meetings, and workspace inspections. Line management accountability for ES&H is growing, as line managers participate in inspections and accident investigations, and receive performance reviews that consider staff safety.

The following common noteworthy practices were found during FY05 MESH reviews:

1. Strong safety communication by management is evident for all divisions. EH&S has monthly safety committee meetings with action items identified and tracked until completion. Minutes are provided to each EH&S group for dissemination to staff. Life Sciences has multiple forums to communicate safety policies and issues to its staff; the Division utilizes postings, e-mails, group meetings, and division-specific training to promote safety at the benchtop level. Genomics has weekly safety updates to ensure the flowdown of safety information to employees and ensure consistency. The Directorate/Operations made considerable progress in improving the content and clarity of its ES&H communications.
2. Divisions are providing customized training to their employees and student staff to address, in some instances, high or seasonal staff turnover. The training not only includes on-the-job training but also small-scale (i.e., individual labs) training to ensure work-specific training and review of work procedures.
3. Divisions are responsive to deficiencies identified from inspections and appraisals. Two divisions experienced radiological violations and demonstrated a strong commitment to mitigate the deficiencies and prevent recurrence.

Common deficiencies from the four divisions are described below:

1. Two of the divisions require improvements in their ergonomics program. Life Sciences has a relatively low number of ergonomic evaluations, considering its number of employees and guests. Genomics has employees that appear to not adhere to required ergonomic controls; the Division is also not tracking all of its ergonomics findings in the Ergonomics Database.
2. The self-assessment inspection programs of two divisions could be more effective. The MESH teams noted significant safety and chemical hygiene violations in several of the facilities that they inspect. These violations should have been identified by the divisions' self-assessments.

Noteworthy practices and opportunities for improvement identified in each assessment are provided in Appendix C.

# ES&H Improvements

## **Status of Fiscal Year 2004 (FY04) Self-Assessment Corrective Actions**

Each year, as a result of the annual ES&H self-assessment process, the Laboratory identifies institutional issues that require management action. The status of the corrective actions for the institutional issues identified in the FY04 ES&H Self-Assessment Report is described below.

### **1. Tracking and Resolving Safety Deficiencies**

- All divisions are using LCATS to track workspace safety deficiencies. In an effort to address persistent difficulties in resolving safety deficiencies, AFRD has added the resolution of LCATS findings as a condition in the employee review process for 2006.
- The Laboratory has developed and launched a new version of LCATS, now known as the Corrective Action Tracking System (CATS). This system has an improved user interface, making the new system much easier to use. This should facilitate more diligent usage by the Laboratory community and lead to more timely resolution of safety deficiencies. In addition, the new CATS database is more flexible in scope than LCATS, allowing for easier tracking of programmatic opportunities for improvement identified during previous self-assessments.

### **2. Occupational Safety and Health Administration (OSHA) Deficiencies**

The EH&S Division initiated several efforts to address OSHA deficiencies in staff workspaces. These include the following actions:

- The EH&S Division hired a new Occupational Safety Group leader in spring 2005. The new group leader is a trained OSHA inspector and has made identifying and resolving OSHA deficiencies a priority. The integrated functional appraisals conducted during the 2005 performance year, all of which included Occupational Safety Group members as part of the appraisal teams, focused on OSHA deficiencies.
- Engineering and EH&S divisions sponsored a consultant who evaluated machine guarding in all Engineering Division machine shops. The consultant identified many deficiencies, and proposed corrective actions. Engineering submitted requisitions to vendors for modification and retrofitting of existing machines, and this work commenced in August 2005.
- The EH&S Division, with support from the Office of Contract Assurance, conducted an electrical safety self-assessment in spring 2005. As a result of the assessment, many improvements were made to the electrical safety program. DOE representatives validated the results of this assessment. Related to electrical safety, the EH&S Division hired a consultant to support the institutional electrical safety program.

### **3. Ergonomic Workstation Evaluations**

- The divisions expended considerable resources in performing ergonomic workstation evaluations during the 2005 performance year. As a result, over 700 evaluations were completed Laboratory-wide. Most notably, the Directorate performed 264 evaluations. Although great effort has been expended to evaluating computer workstations, some modifications are required to provide the divisions with the best support possible. Valuable tools, such as the EH&S Training Database and Ergonomics Database, can be improved to provide even greater support to these divisional efforts.

### **FY05 Recommendations for Institutional Improvements**

Based on the results of the FY05 Division Self-Assessments, IFAs, and the SRC MESH reviews, the following opportunities for institutional improvement are recommended:

#### **1. HEAR Database**

- The EH&S Division should partner with the Laboratory's divisions to update the HEAR database for all Laboratory workspaces. Some divisions resist using the database because they find the system difficult to navigate, with little value provided. The EH&S Division should strive to enhance HEAR's ease of use, and demonstrate the advantages of a current, institutional hazard inventory. A contemporary hazard and authorization inventory offers the following benefits: (1) the database effectively documents that lower-level routine workspace hazards are identified and appropriately controlled; (2) a current inventory of all institutional workspace hazards is an asset to emergency response operations, and (3) as the Facilities Division operations database (Maximo) interfaces with HEAR, a current HEAR inventory provides Facilities staff with accurate knowledge of hazards when entering workspaces across the Laboratory. Accurate information from HEAR can help prevent Facilities staff from entering workspaces that require additional authorization (e.g., radiological materials areas, laser labs, etc.).

#### **2. Communication of the UC/LBNL MOU**

- Although the MOU for ES&H responsibilities was signed by LBNL and UC in early calendar year 2004, divisions are still unsure of their responsibilities regarding training, inspections, and ES&H communications for their staffs working in Appendix I spaces. Divisions are unsure of how their existing division self-assessment programs should account for these staff members.

#### **3. EH&S Database Support of Ergonomic Evaluations**

- The EH&S Division has developed several valuable tools to aid divisions in controlling repetitive motion injuries that can arise from working at computer workstations. Two vital tools are the EH&S Training Database and the Ergonomics Database; however, these databases provide divisions with inconsistent information about staff completing ergonomic evaluations of workstations. For example, in many instances, the Training

Database has credited staff with completing ergonomic evaluation training (EHS0068), but the Ergonomics Database shows that evaluation requests for the same staff members are unfulfilled. The databases must be consistent in providing information so divisions can effectively allocate resources to address these hazards.

- In addition, when the Training Database requires staff to complete EHS0068 (several divisions have made this a requirement through the Job Hazards Questionnaire [JHQ]), this should automatically generate an evaluation request in the Ergonomics database. Presently, divisions must rely upon staff completing the JHQ and then independently entering an evaluation request in the Ergonomics database. This is an inefficient process.

#### **4. Satellite Accumulation Area (SAA) Compliance**

- Compliance with SAA requirements declined significantly since the 2004 performance year. Laboratory-wide performance dropped five percent (from almost 96% to 91%) for SAA compliance, and five of the NCARS issued in 2005 were for waste stored in an SAA for greater than one year. Noncompliant waste storage at generator locations is a significant regulatory liability for the Laboratory.

## Appendix A

### FY05 Division Self-Assessment Performance Criteria

EXPECTATION	VALIDATION	RATING
<b>DEFINE WORK</b>		
<p>E1. Line management regularly communicates ES&amp;H policies, procedures, and lessons learned to all staff. Division staff has clear lines of communication to convey ES&amp;H issues to Laboratory and division management. Examples of appropriate communication/policy include, but are not limited to:</p> <ul style="list-style-type: none"> <li>• Annual all-hands division meeting</li> <li>• Active Division Safety Committee</li> <li>• Group safety meetings</li> <li>• Division ES&amp;H Web site</li> <li>• Roles and responsibilities detailed in ISM plan</li> <li>• Division-wide e-mails</li> </ul>	<p>V1. Are ES&amp;H issues discussed and documented in on-going meetings between line management and staff? Is process systematic?</p>	<p>satisfactory - green partial - yellow marginal – red</p>
<p>E2. Work planning for new and existing work includes environmental performance reviews. Review includes waste reduction, emission reduction, and/or resource conservation.</p>	<p>V2. 1) Divisions demonstrate progress in waste minimization opportunities identified in PY04 self-assessment. 2) For PY05, divisions conduct documented environmental performance reviews for new experimental work.<sup>1</sup> Waste reduction and resource conservation strategies are implemented, as applicable. Divisions include waste minimization and resource conservation in division project review protocols. 3) For PY05, divisions with no new work conduct an environmental performance review for at least one existing research or operations process.</p>	<p>satisfactory - green partial - yellow marginal – red</p>

<sup>1</sup> New work is defined as: (a) work requiring new or significantly modified formal work authorization, (b) new project with new funding, or (c) existing work with a significant change in scope.

EXPECTATION	VALIDATION	RATING
<b>IDENTIFY HAZARDS</b>		
E3. Workspaces are inspected and evaluated on a regular basis.	V3. % Division workspace inspected.	>90% - green >70% - <90% - yellow <70% - red
E4. Divisions have a process to identify, analyze, and categorize hazards associated with work. Examples of hazard inventory include: <ul style="list-style-type: none"> <li>• HEAR database</li> <li>• project safety review</li> <li>• workspace safety review</li> </ul>	V4. For all Division projects, programs, and operations, have hazards been identified and inventoried? Does inventory include both new work and modification of existing work?	satisfactory - green partial - yellow marginal - red
<b>CONTROL HAZARDS</b>		
E5. Divisions ensure engineering and other safety controls are in place and maintained. Examples of engineering controls include, but are not limited to: <ul style="list-style-type: none"> <li>• guards</li> <li>• fume hoods</li> <li>• interlocks</li> <li>• personal protective equipment</li> <li>• gas monitors</li> </ul>	V5. Are engineering controls monitored as part of division self-assessment program? Are controls certified/checked, calibrated, and/or serviced within the required schedule?	satisfactory - green partial - yellow marginal - red
E6. Divisions ensure administrative controls are in place and maintained. Examples of administrative controls for self-authorized work include: <ul style="list-style-type: none"> <li>• work procedures</li> <li>• project safety reviews</li> <li>• assurance letters</li> </ul>	V6. Are hazards controlled for all division projects? Are administrative controls reviewed annually and when work is modified? This includes work under formal authorizations (e.g., AHDs, RWAs) and self-authorized work (i.e., Division approval only).	satisfactory - green partial - yellow marginal - red
E7. Divisions ensure that ergonomic issues are effectively addressed for work processes and staff workstations.	V7. Does the Division have an active ergonomic program for its employees, including ergonomic training (i.e., EHS0060, EHS0052, EHS0062), evaluations, and controls for work processes and workstations? Are evaluation recommendations implemented?	satisfactory - green partial - yellow marginal - red

EXPECTATION	VALIDATION	RATING

EXPECTATION	VALIDATION	RATING
<b>CONTROL HAZARDS</b>		
<p>E8. Divisions ensure that peroxide-forming chemicals are effectively controlled. Examples of controls include:</p> <ul style="list-style-type: none"> <li>• Locations and owners of peroxide-forming chemicals are identified.</li> <li>• Peroxide-forming chemicals are labeled in accordance with the Chemical Hygiene and Safety Plan.</li> <li>• Peroxide-forming chemicals are tested in accordance with the Chemical Hygiene and Safety Plan.</li> </ul>	<p>V8. Does the division have a program to control peroxide-forming chemicals?</p>	<p>satisfactory - green partial - yellow marginal - red</p>

	<b>PERFORM WORK</b>	
E9. Work is performed within the ES&H conditions and requirements specified by Laboratory policies and procedures.	<p>V9a. Work within authorization: % SAA compliance (MWSAAs, RWCAs)</p> <p>% Authorization compliance (i.e., RWAs, RWPs, XAs, AHDs)</p> <p>% compliance QA waste samples</p> <p># Waste Management–issued NCARs</p>	<p><i>regulatory-driven</i> &gt;90% - green &gt;75% - &lt;90% - yellow &lt;75% - red</p> <p><i>regulatory-driven</i> &gt;90% - green &gt;75% - &lt;90% - yellow &lt;75% - red</p> <p><i>regulatory-driven</i> &gt;95% or only 1 failure - green &gt;92% - &lt;95% - yellow &lt;92% - red</p> <p><i>regulatory-driven</i> 0 - green type 1* - yellow type 2<sup>@</sup> - red</p>

EXPECTATION	VALIDATION	RATING
	<b>PERFORM WORK</b>	
E10. Staff is proficient in performing work safely.	V9b. Injuries and Accidents: Is TRC rate under 2.62 or evidence of divisional improvement?	<i>contract-driven</i> TRC >25% below 2.62 or 20% improvement or 1 case/yr - green TRC <25% below/above 2.62 or 10% improvement or 2 cases/yr - yellow TRC >25% above 2.62 - red
	Is LWC rate under 1.50 or evidence of divisional improvement?	<i>contract-driven</i> DART >25% below 1.50 or 20% improvement or 1 case/yr - green DART <25% below/above 1.50 or 10% improvement or 2 cases/yr - yellow DART >25% above 1.50 - red
	V10a. % completion of JHQs or equivalent system.	>90% - green >80% - <90% - yellow <80% - red
	V10b. Based on JHQs or training profiles, % completion rate for required courses.	>90% - green >80% - <90% - yellow <80% - red
E11. Divisions review at least one research or Operations process. Reviews are documented and, if possible, waste-reduction strategies implemented.	V11. 1) Divisions demonstrate progress in minimization opportunities identified in FY04 self-assessment.	satisfactory - green partial - yellow marginal - red
	2) Divisions review at least one research or operations process. Reviews are documented and, if possible, waste reduction strategies implemented. Divisions include waste minimization in division project review protocols.	
	3) Divisions that generate no regulated waste pursue minimization opportunities for other wastes (paper, batteries, toner, etc.).	

EXPECTATION	VALIDATION	RATING
FEEDBACK AND IMPROVEMENT		
E12. Managers and staff are regularly involved in ES&H feedback and improvement activities.	V12. Do line management (including division directors, principal investigators, and senior/mid managers) and staff participate in feedback and improvement activities (i.e., walk-throughs, programmatic safety review, and other ES&H activities)?	satisfactory - green partial - yellow marginal - red
E13. ES&H deficiencies identified from workspace inspections, self-assessment activities, and external appraisals are corrected in a timely manner. A downward trend of Level 1 and 2 LCATS repeat deficiencies is established.	V13. % completion rate of LCATS corrective actions (Levels 1, 2, and 3) implemented in a timely manner.	>90% - green >80% - <90% - yellow <80% - red
E14. ES&H programmatic deficiencies identified from MESH Reviews, IFAs, and previous Division Self-Assessments are corrected in a timely manner.	V14. % completion rate of programmatic corrective actions identified during MESH Reviews, IFAs, and previous Division Self-Assessment implemented in a timely manner.	>90% - green >80% - <90% - yellow <80% - red
E15. Division performs thorough review of all staff injuries and accidents, including analysis of conditions that led to injury and implementation of corrective actions.	V15. Has the division ensured that accident causes and corrective actions for first aid and recordable injuries are effectively identified on SAARs? Are corrective actions implemented?	satisfactory - green partial - yellow marginal - red



## Appendix B

## FY05 Division Self-Assessment Performance Ratings

Criteria	AFRD	ALS	Chemical Sciences	Computing Sciences	Directorate	EH&S	Engr	Environ. Energy Tech	ESD	Facilities	LSD	MSD	Nuclear Sciences	Phys Biosci.	Physics	Genomics	Expectation Score
Evidence of strong ES&H communication	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	100%
Work planning includes environmental performance reviews	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	100%
% Work space inspected	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	95%	100%	97%	100%	100%
Hazards and environmental impacts identified, analyzed, and categorized	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	100%
Engineering controls in place and maintained	Yes	Yes	100%	100%	Yes	Yes	Yes	Yes	100%	Yes	Yes	Yes	95%	Yes	Yes	Yes	100%
Formal authorized work reviewed annually and when work is modified	Yes	Yes	Yes	N/A	N/A	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	100%
Self-authorized work reviewed annually and when work is modified	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	100%
Ergonomics issues effectively addressed	Yes	Yes	Partial	Yes	Yes	Yes	Partial	Yes	Yes	Yes	Partial	Partial	Yes	Yes	Partial	Yes	89.6%
Chemical inventory maintained	100%	89%	85%	N/A	N/A	89%	85%	90%	95%	100%	93%	94%	93%	100%	100%	100%	100%
Peroxide forming chemicals are controlled	Yes	N/A	Yes	N/A	N/A	Yes	N/A	Yes	Yes	N/A	Yes	Yes	Yes	Yes	N/A	Yes	100%
% Completion of OSHA instances	76%	100%	100%	100%	100%	97%	67%	93%	100%	77%	94%	100%	89%	100%	100%	100%	100%
% SAAs in compliance	75%	91%	91%	N/A	N/A	85%	100%	88%	100%	100%	90%	90%	94%	100%	100%	100%	90.5%
# radiological authorization noncompliances	0	0	0	N/A	N/A	1	N/A	0	2	0	2	0	0	1	0	N/A	88.9%
# environmental violations and unplanned releases	0	0	0	N/A	N/A	0	0	0	0	1	0	0	0	0	0	1	95.2%
% QA compliance rate	100%	95%	100%	N/A	N/A	100%	98%	98%	100%	100%	99%	98%	100%	100%	100%	96%	100%
# NCARs	0	0	0	N/A	N/A	1	0	1	0	1	0	2	1	0	0	0	76.2%
TRC rate	0.00	1.28	1.09	1.13	2.12	1.28	2.00	0.98	1.57	4.71	0.44	1.48	1.06	0.00	0.00	0.71	N/A
DART rate	0.00	1.28	0.00	0.56	0.27	1.28	1.20	0.49	0.00	2.57	0.00	0.00	0.00	0.00	0.00	0.71	N/A
% Job hazard questionnaire (JHQ) completed	93%	100%	93%	92%	95%	94%	99%	95%	93%	91%	93%	92%	96%	96%	93%	93%	100%
% Completion rate of required courses	95%	94%	96%	95%	95%	94%	95%	92%	92%	94%	94%	91%	93%	94%	86%	94%	97.9%
Student safety issues effectively addressed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	N/A	Yes	Yes	Yes	Yes	Yes	Yes	100%
Managers and staff involved in ES&H feedback and improvement	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Partial	97.9%
Workspace safety LCATS completion rate	74%	93%	98%	100%	99%	90%	97%	97%	95%	100%	100%	94%	82%	95%	82%	95%	91.7%
Programmatic LCATS resolved	Yes	Yes	N/A	Partial	Yes	Yes	Yes	Yes	Yes	Partial	Yes	Yes	Yes	Yes	Yes	Yes	95.6%
SAARs properly completed and corrective actions implemented	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	100%
Division Score	94.2%	100%	98.5%	97.8%	100%	94.2%	98.4%	95.7%	98.6%	93.7%	97.1%	95.7%	95.7%	98.6%	95.5%	97.0%	96.7%

## Appendix C

### FY05 Self-Assessment

#### Noteworthy Practices and Opportunities for Improvement

DIVISION	REVIEW	NOTEWORTHY PRACTICES	OPPORTUNITIES FOR IMPROVEMENT
Accelerator and Fusion Research	Division SA	<ul style="list-style-type: none"> <li>Senior management involvement is very strong. The Division Director holds dedicated all-hands safety meetings with each program and sends a strong message to line management and staff of his expectation for safety.</li> <li>The QUEST program is a comprehensive and effective program that utilizes line managers and staff to proactively identify, assess, and control hazards in AFRD workspaces.</li> </ul>	<ul style="list-style-type: none"> <li>SAA compliance was 75% for 2005. 18 of 24 SAAs were compliant during two rounds of inspections.</li> <li>The Division is not completing ES&amp;H deficiencies in a timely manner. Only 74% of LCATS-tracked items were corrected in a timely manner.</li> </ul>
	IFA	<ul style="list-style-type: none"> <li>The Division uses a network of researchers tasked with various levels of ES&amp;H oversight. Each program (AFRD is composed of six distinct experimental programs) has an employee assigned ES&amp;H responsibility as part of the Division's day-to-day monitoring of Division activities.</li> <li>The Superconducting Magnet Test stand in Building 58 has redesigned and built an experimental apparatus that exceeds required guarding and shielding, particularly with respect to mechanical and electrical vulnerabilities. The installed shielding was designed to provide worker protection even as the experiment evolves in the future.</li> <li>The L'Oasis experiment in Building 71 has taken several steps beyond compliance. The interlock system exceeds requirements as well as a number of best practices with respect to electrical guarding and control practices. Examples of these best practices can be seen throughout this experimental area.</li> </ul>	<ul style="list-style-type: none"> <li>AFRD has been very space-challenged. The Division occupies old buildings with numerous roof leaks, falling ceiling tiles, crumbling walls and floors, and groundwater leaks. All findings are being entered into LCATs, and they are attempting to work with facilities to repair these problems.</li> <li>Some of the spaces are cluttered with items that should be identified for disposal. This causes problems due to lack of space, and creates clearance issues for equipment and machinery.</li> <li>There still exist some problems with temporary electrical feeds for fixed equipment.</li> <li>The Division is aggressively mitigating the above-mentioned problems and has shown a serious commitment to continue this effort. The Division has recently committed \$30,000 to clean out B58 and other areas.</li> </ul>

DIVISION	REVIEW	NOTEWORTHY PRACTICES	OPPORTUNITIES FOR IMPROVEMENT
Accelerator and Fusion Research (continued)		<ul style="list-style-type: none"> <li>AFRD leads the Laboratory in compliance in Posted Lockout/Tagout required procedures. All experimental apparatus that have more than one point of hazardous energy control have posted procedures.</li> <li>AFRD leads the Laboratory in posted interlock testing procedures. All AFRD experiments that require these posted interlock procedures are in compliance, and logs of the periodic testing are kept.</li> <li>AFRD does an excellent job of equipment, apparatus, and experiment-specific training. An example is the superconducting magnet testing facility, which gave safety training for all hazards, component by component, from one end of the experiment to the other. This was accomplished during several safety meetings, and all employees were involved as both presenters and trainees.</li> </ul>	
Advanced Light Source	Division SA	<ul style="list-style-type: none"> <li>ALS uses several well-established methods and multilevel forums (from the ALS Director down and from the beamline worker up) to routinely and proactively discuss/resolve ES&amp;H issues.</li> <li>Student researchers are assigned to specific staff to assure that safety work assessments, training, and workplace supervision are effective.</li> <li>ALS is aggressive and comprehensive in accident/injury follow-up with high-level management attention devoted to all cases as well as detailed staff analysis and causal correction.</li> </ul>	
	IFA	<ul style="list-style-type: none"> <li>ALS is very committed to allocating resources to ensure a safe work environment. The Division has safety professionals, which include a full-time EH&amp;S coordinator, a part-time EH&amp;S administrator, and a full-time matrixed Radiological Control Technician (RCT).</li> </ul>	<ul style="list-style-type: none"> <li>The ALS should pay particular attention to safety issues that arise due to overcrowding of the ALS experiment floor. The trip hazards, bump hazards, sharp edges, and narrow passages noted in the IFA have potential to become more serious issues as more</li> </ul>

DIVISION	REVIEW	NOTEWORTHY PRACTICES	OPPORTUNITIES FOR IMPROVEMENT
Advanced Light Source (continued)		<p>The EH&amp;S coordinator and administrator conduct quarterly walk-throughs of all Division space. In addition to the safety professional, the ALS has a team of beamline coordinators who walk the ALS experiment floor daily and coordinate safety inspections of all user experimental equipment.</p> <ul style="list-style-type: none"> <li>ALS has multiple safety review programs, including processes for experiment review, beamline review, the QUEST program, and the radiation safety program. In one way or another, these programs involve all employees of the ALS.</li> <li>The Key Enable procedure is an outstanding process that ensures new and modified beamlines are thoroughly inspected for all safety requirements before being brought online. This process was developed by the ALS. It demonstrates exemplary initiative and goes beyond compliance.</li> </ul>	<p>beamlines and more researchers crowd into the area in the future.</p> <ul style="list-style-type: none"> <li>More effort should be made to keep clear areas for duck and cover.</li> <li>All machine equipment should be inspected and brought up to current standards.</li> </ul>
Chemical Sciences	Division SA	<ul style="list-style-type: none"> <li>The Division has a very effective accident prevention program. The Division Deputy addresses each injury or accident directly. It is a standing topic at the bimonthly meetings of the Deputy, safety coordinator, and liaison. This demonstrates a proactive approach towards accident prevention. For the performance year, the Division had only one recordable injury and no lost time workdays.</li> <li>The Division has a large number of students, most of whom work on campus only. The PIs comply with the safety agreement between LBNL and UCB, and students are obligated to complete UC ES&amp;H training where required. The Division Deputy has a campus meeting for these students. At the meeting, the Deputy explains that a postdoc is always involved where students are working, and that a check-out of procedures is always required.</li> </ul>	<ul style="list-style-type: none"> <li>91% of those required to take EHS0060 have completed the course; however, seven requested evaluations are incomplete for longer than the mandated time. In addition, in the past, the Division has not done evaluations for scientists, and has focused on administrative staff. (They are planning to complete evaluations for theorists.) They have not thoroughly analyzed other potential ergonomic hazards for their work. At the least, a review of their policies in this area would be useful. Though they may not yet have scientists or students with ergonomic injuries, there are examples in the rest of the Laboratory.</li> </ul>
Computing	Division SA	<ul style="list-style-type: none"> <li>Computing Sciences has 94% staff ergo trained for 2005.</li> </ul>	<ul style="list-style-type: none"> <li>Computing Sciences does not have a systematic</li> </ul>

DIVISION	REVIEW	NOTEWORTHY PRACTICES	OPPORTUNITIES FOR IMPROVEMENT
Sciences  Computing Sciences (continued)	MESH	<p>Ergo evaluation requests are promptly addressed. Only two requests for evaluation are unfulfilled. &gt;95% of issues identified are resolved quickly and fully. Emerging ergo issues associated with the growing use of “laptop” PCs is a significant challenge for Computing Sciences supervisors.</p> <ul style="list-style-type: none"> <li>• Computing Sciences organizations and work efforts generate very little waste. Waste reduction and resource conservation achievements are recorded in the CS Waste Minimization report.</li> <li>• Computing Sciences senior management proactively relocated all staff out of the seismically inadequate Building 50D, even though office space is at a premium in the Division.</li> <li>• Once the Linux cluster in Bldg. 943 was identified as a potential noise hazard, effort was made to protect hearing.</li> <li>• Procedures for avoiding halon exposure in Building 50B are well implemented.</li> <li>• The Division diligently followed up on a past floor tile lifting injury by purchasing and distributing several “Upright Tile Lifter” tools.</li> <li>• Energized Work Permit Awareness training is required for CS staff working in relevant environments.</li> </ul>	<p>process for identifying and inventorying hazards. Workspace inspections focus on safety deficiencies. However, the Division has no methodology to inventory existing hazards and self-authorize that these hazards are controlled.</p> <ul style="list-style-type: none"> <li>• Computing Sciences should stress required workstation evaluations and a more proactive approach to achieve zero ergo injuries/accidents. The Division had one ergo recordable injury related to extensive use of a laptop in completing a time-dependent project. The 2002 MESH review identified a similar finding.</li> <li>• Computational Research has not been as diligent in pursuing ergonomic evaluations as other Computing Sciences/Directorate divisions.</li> <li>• The hazard analysis process for routine work was not well demonstrated. The semiannual safety review checklists (i.e., group safety checklist and space safety checklist) are outstanding tools for performing hazard review, but they have not been used for the past couple of years. Computing Sciences should begin using these documents again in reviewing and controlling hazards.</li> </ul>
Directorate/ Ops	Division SA	<ul style="list-style-type: none"> <li>• The Division experienced significant changes in 2005. There were management and structural changes to add to the number and geographical diversity of the units, which can make communication difficult. Given these factors, the Division made considerable progress in addressing issues of line management communication.</li> </ul>	

DIVISION	REVIEW	NOTEWORTHY PRACTICES	OPPORTUNITIES FOR IMPROVEMENT
Directorate/ Ops (continued)		<p>A Division Safety Management Executive Committee and a Line Management Committee meet regularly to discuss ES&amp;H issues. All managers (of the various units in the Directorate) were required to coordinate two safety meetings of their staff during the year. Some units also have a “safety minute” at all of their leadership meetings. In addition to ES&amp;H information being delivered and discussed at these meetings, the</p> <p>Coordinator provides “Safety Tips” and “Spot Light on Safety” information, and presents trainings (e.g., how to close out ergonomic evaluations) where appropriate. In addition, the Line Management Committee is responsible for sending e-mails on ES&amp;H topics to Level 1 employees or supervisors. These cover training issues, unresolved ergonomic evaluations, lessons learned, roles, and responsibilities. The Division has made great strides in this area.</p> <ul style="list-style-type: none"> <li>• Only office items are used in these groups, yet the Division made considerable strides in the area of waste minimization and attention to environmental concerns. A flyer was prepared to remind employees to recycle; “green” products are ordered wherever possible; additional can/bottle recycle containers and battery containers were placed in off-site buildings; toner cartridges, transparencies, and diskettes are recycled; the computer “buy back” program was studied, and off-site building issues were addressed. The efforts in this area were noteworthy.</li> <li>• The Division has made significant progress in the ergonomic arena. 93% of the staff completed EHS0060 (this number includes staff who were reassigned to divisions during the year); the Division performed 98 evaluations for CUE-represented staff, and 166 evaluations for non-CUE employees. Many evaluations are in progress, as they are being done for new hires and</li> </ul>	

DIVISION	REVIEW	NOTEWORTHY PRACTICES	OPPORTUNITIES FOR IMPROVEMENT
Directorate/ Ops (continued)	MESH	<p>recent moves. Only two requested evaluations have not been performed, and most recommendations have been implemented. The Coordinator also presented ergonomic information to several different groups, and organized monthly e-mails to the Line Management Committee on unresolved ergonomic items. The Division has taken an aggressive approach to this criterion and accomplished a lot in 2005.</p> <ul style="list-style-type: none"> <li>The MESH team noted significant Directorate/Operations safety management improvements in its 2005 ISM Plan content, clarity and communication; in evaluating, monitoring, and correcting employee workstations; and in finding and fixing workplace safety deficiencies. The team believes these improvements are largely due to the decisive actions made by the Directorate/Operations in chartering a strong safety committee, hiring a dedicated safety program administrator, and clarifying the functions of each.</li> </ul>	<ul style="list-style-type: none"> <li>The Directorate/Operations has made considerable efforts to improve safety supervision and resource responsibilities for matrixed staff and their workspaces. However, much more progress is needed to correct the many complex safety issues surrounding matrixed staff.</li> </ul>
Earth Sciences	Division SA	<ul style="list-style-type: none"> <li>ES&amp;H is the first agenda item at quarterly town-hall meetings and a standing agenda item at weekly Division and department/group meetings. Safety Committee meets monthly; Division Director attends quarterly. In addition to these safety discussions, lessons learned and other ES&amp;H issues are communicated by Level 1 e-mails. "Health and Safety at a Glance" posters are displayed in all work areas, and are included in the new employee packet. The ES&amp;H Web site is maintained and contains all ESD policies, procedures, links to resources, and the ISM plan. Daily tailgate safety meetings are held for fieldwork.</li> <li>100% of workspace was inspected twice during semiannual management walk-throughs using ISM walk-through checklists. Division Director and department heads accompanied the Division Safety Coordinator and</li> </ul>	<ul style="list-style-type: none"> <li>ESD received 2 radiological authorization Level 2 noncompliances. Violation of RWA #1107 involved unauthorized work with radioactive material without required escort form. Violation of RWA #1016 involved the use of facilities for radiological work not authorized in the RWA.</li> </ul>

DIVISION	REVIEW	NOTEWORTHY PRACTICES	OPPORTUNITIES FOR IMPROVEMENT
Earth Sciences (continued)	IFA	<p>EH&amp;S Liaison. 100% ESD lab space inspected by EH&amp;S electrical experts.</p> <ul style="list-style-type: none"> <li>Chemical inventory is tracked using the Chemical Management System (CMS) database. Lab-space lead PIs review all new work in their labs for hazards. Each lab maintains a Laboratory Safety Primer binder that identifies lab-specific hazards and controls.</li> <li>All students complete the Job Hazards Questionnaire (JHQ) with their supervisor/mentor, and do not work unsupervised until training has been completed. Student mentors took EHS0024 or received a copy of notes.</li> </ul> <p>Students are required to follow ISM and receive the “Health and Safety at a Glance” in their new employee packets.</p> <ul style="list-style-type: none"> <li>The lab PI in 70-4459 promoted the Lab Safety Primer and glove selection chart to the IFA team, emphasizing commitment to safety. All ESD Labs have Lab Safety Primers.</li> <li>Management walk-throughs are personally led by the ESD Director, while the ESD safety coordinator, group leaders, and department heads also attend. The walk-throughs are an effective method for line management review of Division space and promoting workplace safety.</li> <li>Given the matrix nature of ESD, each lab space has a designated lead PI who is responsible for identifying lab hazards, and notifying others working in the lab space about the hazards. This designation system was developed by the Division, which also includes the creation of customized lab entry signs to clearly identify who has primary responsibility for the space.</li> </ul>	<ul style="list-style-type: none"> <li>Increased vigilance is warranted in the areas of seismic safety, office ergonomics for students, housekeeping, and machine guarding/safety.</li> </ul>
Engineering	Division SA	<ul style="list-style-type: none"> <li>The Hazards, Equipment, and Authorizations Review (HEAR) System is utilized in the Division for its space.</li> </ul>	<ul style="list-style-type: none"> <li>94% of required staff has completed EHS0060. Five requested ergonomic evaluations remain unresolved.</li> </ul>

DIVISION	REVIEW	NOTEWORTHY PRACTICES	OPPORTUNITIES FOR IMPROVEMENT
Engineering (continued)		<p>Updating the hazards inventory information was successful; the inventory was coupled to the self-assessment schedule to achieve 100% review updating by occupants for all Engineering space.</p> <ul style="list-style-type: none"> <li>Requirements of personal protective equipment use are posted. Supplemental equipment (hearing protection, eye protection, head protection, hand protection, etc.) is readily available. EH&amp;S Division Industrial Hygiene personnel certify/check fume hoods, air ventilation systems, bio-cabinets, and glove boxes as required. Monitors (toxic and flammable gas, stack emission, ventilators, oxygen deficiency, and etc.) are being calibrated and serviced per the current EH&amp;S schedule.</li> </ul> <p>These items are routinely inspected during the Self-Assessment to verify updated inspection tags/stickers.</p> <ul style="list-style-type: none"> <li>The Engineering Division worked with its EH&amp;S assigned liaison to bring in a machine guarding consultant to provide guidance in insuring the Laboratory meets the standards. The consultant provided a full report. Requisitions have been submitted to vendors for the modification/retrofit work that commenced in August 2005.</li> <li>The Engineering Division Safety Coordinator solicited the expertise of its Electronics Photo-fabrication main operator to review and utilize the Chemical Management System (CMS) peroxide forming criteria, and to review all Engineering system-inventoried chemicals, to insure the identification of chemical owners. This effort provides future assurance that the Division can monitor its chemicals for peroxide formers.</li> <li>The Division Director performs walk-throughs on most of the Engineering spaces and encourages managers to do the same. Division deputies, senior managers, PIs, and supervisors are routinely out in the field, reviewing</li> </ul>	

DIVISION	REVIEW	NOTEWORTHY PRACTICES	OPPORTUNITIES FOR IMPROVEMENT
		<p>work, work activities, and general safety.</p> <ul style="list-style-type: none"> <li>The inclusion of division deputies in accident investigations of their staff is an opportunity for them, the affected employee, and the supervisor to engage in feedback and improvement opportunities.</li> </ul>	
EETD  EETD (continued)	Division SA	<ul style="list-style-type: none"> <li>The Division Safety Coordinator sends a quarterly safety newsletter to all Division staff. In addition, the weekly electronic newsletter, "What's New in EETD," frequently includes safety topics.</li> <li>ES&amp;H considerations are integrated into work planning. EETD has one of the most robust forms of ES&amp;H communication at the Laboratory. Staffs are engaged through multiple approaches, including electronic newsletters, committee meetings, management communications, safety coordinator communications, and an ES&amp;H Web page.</li> <li>EETD has a redundant and effective system for performing workspace inspections and inventorying hazards.</li> <li>EETD has a very proactive ergonomic safety program that includes much more aggressive ergonomic evaluation requirements than those required by LBNL.</li> <li>EETD has outstanding hazard control systems. Several noteworthy practices are employed: the process to complete the self-assessment checklists ensures that PIs inspect workspaces, inventory all hazards, and consider appropriate hazard controls. The Division's hazard-control processes are well organized, as formal authorizations and peroxide formers are inventoried with appropriate dates listed. This creates an easy check for remaining in compliance with applicable requirements.</li> <li>Line managers, principal investigators, and group</li> </ul>	<ul style="list-style-type: none"> <li>The Division achieved compliance in only 44 out of 50 SAAs (88%) from two rounds of inspections.</li> <li>One NCAR for improper disposal of CA-regulated waste was cited during the performance year.</li> </ul>

DIVISION	REVIEW	NOTEWORTHY PRACTICES	OPPORTUNITIES FOR IMPROVEMENT
		leaders participate in self-assessment inspections. The Division Director led four safety inspections of Division workspaces.	
EH&S	Division SA	<ul style="list-style-type: none"> <li>The Division held two all-hands meetings with internal, Division-wide ES&amp;H as an agenda item. Each group in the Division also includes safety as a standing item. There is an expectation that group leaders discuss safety one-on-one with their staff. The Division Safety Committee meets monthly and covers a wide range of items, both internal to the Division and relating to their Laboratory function. The ISM plan identifies roles and responsibilities.</li> <li>The Division inspected 100% of its workspace using three different methods: the Self-Assessment Team inspects workspace; group leaders are responsible for annually inspecting their space, and the Division Director and coordinator also do walk-throughs.</li> </ul>	<ul style="list-style-type: none"> <li>85% of SAAs (11 out of 13) were in compliance.</li> <li>A Level 2 EH&amp;S violation of RWA 1009 for "Incorrect Procurement of Radioactive Material" occurred on 01/13/05.</li> <li>The Division received one NCAR for waste stored in an SAA for more than one year.</li> </ul>
EH&S (continued)	MESH	<p>Documentation from the Self-Assessment Team Checklist validating group performance is very good.</p> <ul style="list-style-type: none"> <li>Several different EH&amp;S safety group meeting minutes contained the full history of action items, at the level of approximately one line of information per topic, per meeting. This is a useful way to track the progress of action items from start to completion.</li> <li>A new group leader attended classes offered by his group to the rest of the Laboratory. This is a good way to inform himself of the existing safety regulations and safety education taught at Berkeley Lab, and to look for areas of improvement.</li> <li>Division management is attempting to centralize occurrence reporting so all stakeholders can capture the status of the Laboratory on a daily basis. A full system that satisfies the requirements of approximately nine</li> </ul>	<ul style="list-style-type: none"> <li>Managers are not exercising sufficient scrutiny in reviewing incident reports for completeness and accuracy.</li> </ul>

DIVISION	REVIEW	NOTEWORTHY PRACTICES	OPPORTUNITIES FOR IMPROVEMENT
		<p>different reporting agencies is a noteworthy effort.</p> <ul style="list-style-type: none"> <li>Since the last MESH review, there were three radioactive contamination incidents in the Hazardous Waste Handling Facility (HWHF). These problems were fixed by a combination of reassigning existing experts within the Division to the HWHF to restore core competencies, and by disciplinary action. These actions seemed to have improved the work safety environment.</li> </ul>	
Facilities	Division SA	<ul style="list-style-type: none"> <li>EH&amp;S issues are regularly communicated to all staff via a variety of methods. Each department has regular all-hands meetings that include safety discussion. The Division has four safety committees: an executive safety committee, and one for each of the three departments. Safety committees communicate important issues to their groups. The Division also had an all-hands safety stand-down this performance year. Communications also occur through Workers Observing Workers (WOW) steering and observer meetings, craft safety meetings, e-mails, newsletters, and bulletin boards.</li> </ul>	<ul style="list-style-type: none"> <li>Findings from previous self-assessment year were not tracked in LCATS. In addition, not all findings were fully resolved.</li> <li>Facilities had one NCAR: the SAA to store broken glass from fluorescent bulbs had waste over one year in storage.</li> <li>Facilities had one release above the regulatory threshold: an 11-liter PCB spill on November 1, 2004.</li> </ul>
Facilities (continued)		<ul style="list-style-type: none"> <li>Facilities has done an admirable job of improving their hazard identification process. Its inspection system, which includes inspections by senior and line managers, the Division Safety Coordinator, and the EH&amp;S liaison, covers all areas multiple times. All hazards are inventoried during the safety coordinator inspections.</li> <li>Self-authorized work is reviewed annually. This is documented in the HEAR database. In addition, through Maximo, all large work orders list the hazards in each work location. Plant Operations/Technical Services has developed hazard evaluation procedures for smaller jobs. Other forms include the task hazard analysis and ZAP form for completing small jobs requested through the work request center.</li> <li>Facilities feedback and improvement methodology has</li> </ul>	

DIVISION	REVIEW	NOTEWORTHY PRACTICES	OPPORTUNITIES FOR IMPROVEMENT
	IFA	<p>improved in recent years. The ARB form created by the Division Safety Coordinator is a noteworthy practice.</p> <ul style="list-style-type: none"> <li>• Ergonomic improvements to B79 Metals Storage Facility, B78 Central Receiving, and B31 Labor Shop Storage Sheds are exemplary.</li> <li>• Storage and housekeeping in B31 Labor Shop storage sheds and B51 rigger's trailer are noteworthy. There are also excellent housekeeping in B82-100, and excellent tool storage in B76-234 Carpentry Shop/HerSafe router.</li> <li>• Readily accessible personal protective equipment (PPE) in B90-0027 mechanical room (hearing protection) and B76-105 Vacuum Pump Shop (safety glasses) promotes regular usage of PPE.</li> <li>• Facilities exhibited proactive injury prevention in the B54-098 mechanical room under Perseverance Hall by padding several bump hazards.</li> <li>• The installation of the drum-dispensing equipment in the B81-100 water tower chemical supply building is noteworthy.</li> </ul>	<ul style="list-style-type: none"> <li>• Many electrical deficiencies (32) were noted, despite numerous, previous electrical inspections.</li> <li>• Machine guarding of fans and other HVAC components is incomplete, and openings wide enough to allow fingers and/or hands to pass through still exist.</li> <li>• Several issues regarding sanitary conditions in the cafeteria were observed.</li> <li>• Instances of broken or improperly stored PPE were found.</li> <li>• Construction debris left behind by contractors were found in several mechanical rooms.</li> </ul>

DIVISION	REVIEW	NOTEWORTHY PRACTICES	OPPORTUNITIES FOR IMPROVEMENT
Life Sciences	Division SA	<ul style="list-style-type: none"> <li>The Division Safety Committee met four times during the course of the year. All groups are represented on the committee. Committee representatives are required to communicate issues back to their groups and bring group concerns to committee meetings. This is required in the committee charter.</li> <li>The Division is pursuing the purchase of two imaging devices that would employ non-radioactive imaging techniques and eliminate the need for photochemicals. This is a noteworthy practice that will reduce mixed waste generation.</li> <li>Line management is involved through regular communication of senior managers, safety committee membership, and completing the space hazards inspection records. Senior and line managers also inspect staff workspaces throughout the year.</li> </ul>	<ul style="list-style-type: none"> <li>The Division does not use the institutional hazard inventory database (HEAR), which leaves this database deficient in listing all hazards across the institution. This impacts other institutional programs, such as Maximo, which means that Facilities workers are not aware of all hazards when they perform work in LSD workspaces. LSD should work with the EH&amp;S Division to effectively and efficiently update the HEAR database using the data provided in the LSD Space Hazards database.</li> <li>Engineering controls are checked during the process of updating the Space Hazards inspection records. However, these inspection sheets do not explicitly list checking engineering controls as a function of these inspections. Rather, engineering controls are listed in the notes section. A more systematic approach is that engineering controls should be better integrated into these inspection records.</li> <li>83% of required staff have completed EHS0060.</li> <li>LSD had 2 RWA violations during the performance year.</li> </ul>
	MESH	<ul style="list-style-type: none"> <li>The Division's planning for the new Potter Street Laboratory facility has resulted in state-of-the-art laboratories with well-equipped safety features in place. The fume hoods, emergency showers/eyewashes, seismic restraints, and chemical storage cabinets are all new or in excellent condition. The design of the facility provides for a safe and environmentally responsible work environment for employees and guests.</li> <li>The bulletin boards and lab signage provided important safety information to employees, including future dates for Division-specific safety training. The employees and students working in the facility are knowledgeable of</li> </ul>	<ul style="list-style-type: none"> <li>The current version of Life Sciences' ISM plan does not specifically address student safety. Given that the Division has a large student population and that an incident occurred with a student in LSD space (Donner Lab), the Division should be more explicit in their plans for student safety.</li> <li>Although the Division has expanded both in terms of funding and space, it has not planned for additional resources for its ES&amp;H program. Division management should provide a backup for the Coordinator in case of his absence from work, and should consider reallocating some of the</li> </ul>

DIVISION	REVIEW	NOTEWORTHY PRACTICES	OPPORTUNITIES FOR IMPROVEMENT
Life Sciences (continued)		<p>safety policies and training requirements.</p> <ul style="list-style-type: none"> <li>The Division does an excellent job of communicating safety to its employees and guests. The Division utilizes postings, e-mails, group meetings, and Division-specific training to promote safety at the benchtop level. The posted safety mini-minutes and schedules for customized ES&amp;H training are particularly noteworthy, and are models for other divisions to develop.</li> <li>Over the years, Life Sciences has maintained an excellent safety record. For the past fiscal year, the Division has had only two recordable injuries; a high completion rate (93%) for required ES&amp;H training; 95% compliance rate for SAA waste storage, decreasing hazardous waste generation; and only two major RWA violations. Given the large number of laboratories working with hazardous materials or high-risk equipment and the frequent turnover of employees and guests, Life Sciences has done an excellent job of performing work safely.</li> <li>The Division is proactive in providing customized training for its staff/students to address its high and seasonal student turnover. Multiple sessions are made available to the staff to fit their schedules. The training is conducted at the work site by the Safety Coordinator.</li> </ul>	<p>Coordinator's responsibilities to other staff. Increased sharing of ES&amp;H responsibilities with others will also enhance the Division's Integrated Safety Management.</p> <ul style="list-style-type: none"> <li>Given that the Division has approximately 580 employees and guests who come and go on a regular basis in multiple locations, the number of ergonomic evaluations appears to be inordinately low.</li> <li>Donner Laboratory facility (Building 1) was generally lacking in seismic restraints for heavy lab equipment, refrigerators, storage shelves, and file cabinets. With Donner Lab as the primary example, there does not appear to be a systematic approach by the Division for identifying earthquake hazards and assuring that seismic controls are in place.</li> <li>The state of safety at the Donner Laboratory appears to be poor. In addition to the seismic deficiencies described above, the laboratories at Donner had deficiencies in chemical inventory and storage, personal protective equipment, waste management, and radiation protection.</li> <li>The Division's self-assessment inspections of Donner Lab are not effective. In spite of numerous inspections this year by the Division, including a walk-through by the Division Director, safety deficiencies are apparently not being noted.</li> </ul>
Materials Sciences	Division SA	<ul style="list-style-type: none"> <li>MSD uses PI assurances and JHQs to assess hazards for continuing and new work assignments. Project safety reviews are also a form of self-authorization.</li> </ul>	<ul style="list-style-type: none"> <li>Materials Sciences has 84% of required staff ergo trained for 2005. Four requested ergo evaluation requests remain unfulfilled. Recommendations from one evaluation are not implemented.</li> <li>MSD was cited with two NCARs.</li> </ul>

DIVISION	REVIEW	NOTEWORTHY PRACTICES	OPPORTUNITIES FOR IMPROVEMENT
Nuclear Science	Division SA	<ul style="list-style-type: none"> <li>The Division has two ES&amp;H committees. One is a Division-wide committee to address broad issues or policies. The 88-Inch Cyclotron also has a committee. These committees meet on a quarterly basis. A representative from the 88-Inch Cyclotron sits on the Division-wide committee. Minutes are being posted on the Web site, and each member of the committee is expected to bring relevant information to their respective groups. The committee has met quarterly.</li> <li>The 88-Inch Cyclotron ES&amp;H Committee met twice. The 88-Inch Cyclotron also held several all-hands meetings, including one dedicated to electrical safety, in PY05.</li> <li>The GRETINA project was extensively reviewed, and will generate no waste. In addition, the machine shop in the 88-Inch Cyclotron uses washable rags; instead of 1-1-1 trichloroethane, isopropyl alcohol is now used for cleaning; toner, discs, and transparencies are recycled; recycled products are ordered for office use whenever possible.</li> <li>The Division ISM plan indicates that students are covered by all the same policies and procedures that cover employees and other guests. Students complete JHQs and required training classes; however, to augment these activities, the Division will hold a special student orientation meeting early in the fall semester, and is developing appropriate handout material.</li> <li>Managers (including the Division Director) and staff participate in a number of assessment activities. They sit on both of the Division ES&amp;H committees, carry out both formal and informal inspections and reviews, communicate directly with EH&amp;S Division specialists to address ES&amp;H issues for their projects, and identify problems and corrective actions.</li> </ul>	<ul style="list-style-type: none"> <li>The Division received one NCAR for waste kept for over a year. Corrective actions have been taken.</li> <li>There were no Level 1 or 2 deficiencies found in FY05. LCATS was used to track deficiencies found in the OSHA, Self-Assessment, and IFA inspections.</li> </ul>
Nuclear Science (continued)			

DIVISION	REVIEW	NOTEWORTHY PRACTICES	OPPORTUNITIES FOR IMPROVEMENT
Nuclear Science (continued)	IFA	<ul style="list-style-type: none"> <li>• NSD demonstrated good use of project/facility safety review questionnaires and electrical hazard risk analyses for the IceCube Project.</li> <li>• NSD has made a commitment to invest in ergonomic furniture and accessories for most offices.</li> <li>• The Division has maintained excellent housekeeping in Building 70 labs and Building 88's shop, east alley niches, Cave 1, and Cave 4A.</li> <li>• The Division is proactive in its seismic hazard abatement in the Building 51 workspace.</li> <li>• There is excellent use of on-the-job-training (OJT) checklists for staff authorized to work under AHD 2068.</li> <li>• The up-to-date emergency response guides posted prominently in Building 88 are models for other Laboratory buildings.</li> </ul>	<ul style="list-style-type: none"> <li>• The 88-Inch Cyclotron Safety Analysis Document should be reviewed and, if necessary, updated to reflect current operating conditions and regulatory requirements.</li> <li>• For the appropriate AHDs, principal investigators should document completion of OJT using checklists maintained in a binder.</li> <li>• The HEAR database should be used to document projects, perhaps by room number, for which project/facility safety review questionnaires are completed.</li> <li>• Building 88 managers should consider instituting periodic electrical inspections by the building's electrical staff. Electrical problems identified during these self-audits should be resolved as quickly as possible.</li> </ul>
Physical Biosciences	Division SA	<ul style="list-style-type: none"> <li>• The Division has a strong ES&amp;H infrastructure that includes many avenues of communication between management and staff. There is an active Safety Planning Team in addition to an ES&amp;H Committee with wide representation and frequent meetings. The Division Director receives regular reports during the year; the ES&amp;H Coordinator meets individually with PIs; PIs deliver ES&amp;H information in group meetings, and everyone is involved in self-assessment.</li> <li>• The Division has an outstanding and comprehensive ES&amp;H program that is a model of ISM. The Planning Team, Coordinator, and ES&amp;H Committee continually review essential issues and introduce creative activities and procedures to insure that all aspects of ES&amp;H are integrated into the Division's research activities. Noteworthy are the triannual reports to the Division</li> </ul>	<ul style="list-style-type: none"> <li>• The Division received one Level 2 radiological authorization noncompliance report. Corrective action was taken.</li> </ul>

DIVISION	REVIEW	NOTEWORTHY PRACTICES	OPPORTUNITIES FOR IMPROVEMENT
		<p>Director, and the formalized annual meeting with each PL.</p> <ul style="list-style-type: none"> <li>100% of workspaces were inspected. The Division has an excellent three-part system that includes all-hands inspections.</li> </ul>	
Physical Biosciences (continued)		<ul style="list-style-type: none"> <li>The Division has an excellent ergonomics program. 94% of employees who are required to take EHS0060 have completed the course. Five additional staff have been trained as evaluators. Significant resources have been expended (~\$8,000) to remedy poor ergonomic configurations. Moreover, the Division planned for the Potter Street move, and creatively awarded ergonomic accessories at the annual self-assessment picnic. The topic is regularly discussed at ES&amp;H Committee meetings. Overall, the Division has a dynamic and effective program.</li> <li>Students are a significant part of the Division's workforce, and they work in LBNL spaces on site and on campus. The safety officer in each group meets individually with incoming students to complete the JHQ; safety officers meet together monthly. Students also receive on-the-job training on equipment and procedures. Systematic records are kept in "Black Books." The Division is willing to deny access until training is complete.</li> <li>The Division's commitment to improvement is demonstrated by the consistently excellent results achieved in ES&amp;H each year. The Division does not just meet the minimum criteria but strives for excellence, adding procedures and activities each year to enhance their program. The noteworthy practices are many, and the scope of the program goes well beyond the specific set of criteria addressed here. Overall, an exemplary program.</li> </ul>	
Physics	Division SA	<ul style="list-style-type: none"> <li>The Division continues its practice of holding annual</li> </ul>	<ul style="list-style-type: none"> <li>70% of Division staff has completed EHS0060. This</li> </ul>

DIVISION	REVIEW	NOTEWORTHY PRACTICES	OPPORTUNITIES FOR IMPROVEMENT
Physics (continued)		<p>mandatory all-hands ES&amp;H meetings. ISM is addressed at this meeting. In addition, a status report is given on ES&amp;H performance, including areas of concern and opportunities for improvement. Information is also communicated at group leader meetings, Physics Management Meetings (PMM), project meetings, heads' and leaders' meetings, and group assistants' meetings where appropriate. A special student orientation meeting was added in PY05.</p> <ul style="list-style-type: none"> <li>The Project Safety Review Questionnaire used by Physics has always included a question about potential damage to the environment. Noteworthy efforts are as follows: <ul style="list-style-type: none"> <li>Only the minimum amount of chemicals necessary for the currently active job is ordered.</li> <li>All-parts cleaning is accomplished with soap, water, and ultrasonic tank; high-quality cleaning takes place in the plating shop.</li> <li>Solvents are only used in small quantities, and with disposable wipes.</li> <li>Accumulation of waste solvents has been eliminated in one major project.</li> <li>Toner, discs, and transparencies are recycled.</li> <li>Recycled products are ordered for office supplies where possible.</li> <li>Computers are replaced or upgraded before they become e-waste.</li> </ul> </li> <li>Student safety is very important to the Physics Division. As noted in the ISM plan, all Division policies and procedures apply to students. The ES&amp;H Committee also recommends special policies; for example, students are expected to attend safety classes rather than complete courses on line, which is sometimes difficult to arrange due to students' schedules.) Also, as outlined in the ISM, it is expected that line managers (group and project leaders in the Physics Division) carry out</li> </ul>	<p>is down from 87% last year. All staff who requested evaluations have received them. Corrective actions identified from three evaluations are not fully implemented.</p> <ul style="list-style-type: none"> <li>Course completion rate is 86%. The classes most people need are New Employee Orientation and Ergonomics. Physics will have a special Ergonomics class this year.</li> <li>82% completion rate for LCATS. All deficiencies found during OSHA and self-assessment inspections have been recorded. Correction of items from previous years has been verified. There were no Level 1 or 2 deficiencies.</li> </ul>

DIVISION	REVIEW	NOTEWORTHY PRACTICES	OPPORTUNITIES FOR IMPROVEMENT
		<p>required hazard communication and on-the-job-training, and appropriate oversight for students. As an example, safety shoes and back-care training were provided on an urgent basis for students who were on assignment at Los Alamos. This is a potential high-risk group, however, so the Committee also supported a special student orientation meeting.</p>	
Genomics	<p>Division SA</p> <p>MESH</p>	<ul style="list-style-type: none"> <li>The Division performed analysis on a waste stream and determined that it is nonhazardous. This reduced 300 gallons per year of potential hazardous waste. For FY06, the JGI will promote the “buy recycled” program.</li> <li>100% of Division workspace is inspected. The Division Safety Coordinator performed walk-throughs on all workspaces with the responsible manager, and documented all safety deficiencies and hazards in “Safety Walk-through and HEAR Database Update” forms. This information is tracked in LCATS and the HEAR database, as appropriate.</li> <li>Senior Division management, including the Division Director and Division Deputy, also inspect staff workspaces.</li> <li>The process of completing the Safety Walk-through and HEAR Database Update forms ensures that all hazards are inventoried. The HEAR database is updated to reflect the most current conditions.</li> <li>Self-authorized work is reviewed through the HEAR update process. Also, the Division conducts a hazard assessment when creating standard operating procedures (SOPs). SOP implementation includes training.</li> <li>The weekly safety updates at JGI management meetings were identified by several people in interviews as</li> </ul>	<ul style="list-style-type: none"> <li>Genomics considers safety is defining their work. Although ES&amp;H communications occur between management and staff, the mechanism could be more systematic. A suggestion for improving this process includes creating a charter for the Division Safety Committee, with defined roles and responsibilities for members. This should include an explicit responsibility for representatives to communicate relevant safety issues between their respective groups and the Committee.</li> <li>One Notice of Violation was received on October 28, 2004, for a waste storage violation from the Central Contra Costa Sanitary District.</li> <li>Managers participate in annual safety walk-throughs with the Division Safety Coordinator. A suggested improvement is that the Division ISM plan could formalize the safety responsibilities of line managers to increase awareness of workspace safety hazards. Many managers do not consider workspace safety hazards except during routine walk-throughs.</li> <li>Safety improvements are ad hoc. The mechanism for implementing safety improvements is not well established.</li> <li>A recommended improvement is the establishment of a formal safety program that integrates the three</li> </ul>

DIVISION	REVIEW	NOTEWORTHY PRACTICES	OPPORTUNITIES FOR IMPROVEMENT
Genomics (continued)		<p>effective means to ensure the flowdown of safety information to employees, and ensure consistency. By including safety in each meeting, a clear communication of management priority for safety is communicated.</p> <ul style="list-style-type: none"> <li>Operating procedures at JGI have excellent discussions of the safety aspects of the task to be performed, including the hazard and hazard controls. Employees were familiar and confident in these procedures.</li> <li>As the MESH review was being conducted, the Genomics Division was finalizing plans for an operational ergonomics review of Building 100. This is a very proactive step to identify potential ergonomic problems with routine work assignments so that work can be redesigned to reduce the risk to employees.</li> <li>Eyewashes are tested weekly, and during safety meetings, employees were shown how to activate these devices. Frequent testing ensures this vital equipment will be available when needed, and the practical demonstrations ensure employees will be familiar with the equipment.</li> </ul>	<p>buildings occupied by the Genomics Division (i.e., buildings 100 and 400 at Walnut Creek, and Building 84 at LBNL). In addition, most employees work for LBNL and are familiar with LBNL safety programs; however, some employees work for LLNL and are not familiar with LBNL safety programs. The MESH review committee was concerned that the differences between the three buildings' safety programs could impede future improvements and confuse workers.</p> <ul style="list-style-type: none"> <li>The Genomics Division must ensure that LBNL safety procedures are understood and followed by employees and subcontractors. The AHD that was reviewed did not include all required signatures, and the management team did not seem to understand the AHD process adequately. In addition, an issue concerning the use of a lockout/tagout procedure in the construction area of Building 400 arose during the MESH review, and resulted in LBNL procedures not being followed. The supervisor of the work in question was a facility supervisor. The issue was resolved promptly and correctly.</li> <li>While ergonomic controls are specified in the Ergonomic Database, the MESH review team found that employees were not adhering to the ergonomic controls. A variety of reasons, including convenience, was presented. The JGI experienced one ergonomic OSHA recordable injury in FY05. More emphasis on ergonomic safety is needed to ensure compliance with hazard controls and to communicate effectively with employees.</li> <li>During the MESH review, it was reported that not all ergonomic findings are being reported and tracked in the Ergonomic Database. This lack of tracking is contrary to LBNL procedures and may inhibit the ability of the organization to perform injury/illness</li> </ul>

DIVISION	REVIEW	NOTEWORTHY PRACTICES	OPPORTUNITIES FOR IMPROVEMENT
Genomics (continued)			<p>analysis and trending to prevent future injuries.</p> <ul style="list-style-type: none"><li>• While the Genomics Division reported a 98% completion rate for Job Hazards Questionnaires, most employees who needed first-aid training were delinquent, and there was no documentation of OJT. Genomics should provide first-aid training for employees required to perform first aid, and develop a formal OJT program. In addition, there were numerous cases where employees had been waived from the training requirement for PGF-10, "Introduction to Environment, Safety, and Health." The MESH Review team felt this was too widespread,<p>and the orientation to the organization should be nearly universal, with very few waivers. Workplace inspections performed by the MESH review team found chemical hygiene problems in Building 400. Specifically, personnel were observed working with hazardous chemicals without the use of proper PPE. In addition, incompatible chemicals were stored in close proximity on shelves. Food was also observed.</p></li></ul>

## Appendix D

### List of Acronyms and Abbreviations

AFRD	Accelerator and Fusion Research Division
AHD	Activity Hazard Document
ALS	Advanced Light Source
BBAP	Behavior-Based Accident Prevention
CATS	Corrective Action Tracking System
CEQA	California Environmental Quality Act
CSD	Chemical Sciences Division
DART	Days Away from work and Restricted Time
DOE	Department of Energy (U.S.)
EETD	Environmental Energy Technologies Division
EH&S	Environment, Health, and Safety Division (LBNL)
ESD	Earth Sciences Division
ES&H	Environment, Safety, and Health (DOE term)
FY	Fiscal Year
GRETINA	Gamma-Ray Energy-Tracking In-beam Nuclear Array
HEAR	Hazards, Equipment, Authorizations, and Review System
HWHF	Hazardous Waste Handling Facility
IFA	Integrated Functional Appraisal
ISM	Integrated Safety Management
JHQ	Job Hazards Questionnaire
LBNL	Lawrence Berkeley National Laboratory
LCATS	Laboratory Corrective Action Tracking System
LLNL	Lawrence Livermore National Laboratory
L'OASIS	Lasers, Optical Accelerator Systems Integrated Studies
LOTO	Lockout/Tagout
LSD	Life Sciences Division
LWC	Lost Workday Cases
MESH	Management of ES&H
MOU	Memorandum of Understanding
MSD	Materials Sciences Division
MWSAA	Mixed Waste Satellite Accumulation Area
NCAR	Nonconformance and Corrective Action Report
NEPA	National Environmental Policy Act
NFPA	National Fire Protection Association
NSD	Nuclear Science Division
OCA	Office of Contract Assurance
OJT	On-the-Job Training
ORPS	Occurrence Reporting and Processing System
OSHA	Occupational Safety and Health Administration

OSSEP	Off-Site Safety and Environmental Protection Plan
PBD	Physical Biosciences Division
POCMs	Performance Objectives, Criteria, and Measurements
PI	Principal Investigator
PPE	Personal Protective Equipment
PY	Performance Year
QUEST	Quality Assurance/Improvement and Environment, Safety, and Health through Self-Assessment and Teamwork
RWA	Radiological Work Authorization
RWCAR	Radioactive Waste Collection Area
RWP	Radiological Work Permit
SAA	Satellite Accumulation Area
SAAR	Supervisor Accident Analysis Report
SRC	Safety Review Committee
SSA	Sealed Source Authorization
TRC	Total Reportable Cases
UCB	University of California at Berkeley
UCOP	University of California Office of the President
WOW	Workers Observing Workers
XSD	X-Ray Machine Safety Document

## Appendix A

### FY05 Division Self-Assessment Performance Criteria

EXPECTATION	VALIDATION	RATING
<b>DEFINE WORK</b>		
<p>E1. Line management regularly communicates ES&amp;H policies, procedures, and lessons learned to all staff. Division staff has clear lines of communication to convey ES&amp;H issues to Laboratory and division management. Examples of appropriate communication/policy include, but are not limited to:</p> <ul style="list-style-type: none"> <li>• Annual all-hands division meeting</li> <li>• Active Division Safety Committee</li> <li>• Group safety meetings</li> <li>• Division ES&amp;H Web site</li> <li>• Roles and responsibilities detailed in ISM plan</li> <li>• Division-wide e-mails</li> </ul>	<p>V1. Are ES&amp;H issues discussed and documented in on-going meetings between line management and staff? Is process systematic?</p>	<p>satisfactory - green partial - yellow marginal – red</p>
<p>E2. Work planning for new and existing work includes environmental performance reviews. Review includes waste reduction, emission reduction, and/or resource conservation.</p>	<p>V2. 1) Divisions demonstrate progress in waste minimization opportunities identified in PY04 self-assessment. 2) For PY05, divisions conduct documented environmental performance reviews for new experimental work.<sup>1</sup> Waste reduction and resource conservation strategies are implemented, as applicable. Divisions include waste minimization and resource conservation in division project review protocols. 3) For PY05, divisions with no new work conduct an environmental performance review for at least one existing research or operations process.</p>	<p>satisfactory - green partial - yellow marginal – red</p>

<sup>1</sup> New work is defined as: (a) work requiring new or significantly modified formal work authorization, (b) new project with new funding, or (c) existing work with a significant change in scope.

EXPECTATION	VALIDATION	RATING

EXPECTATION	VALIDATION	RATING
<b>IDENTIFY HAZARDS</b>		
E3. Workspaces are inspected and evaluated on a regular basis.	V3. % Division workspace inspected.	>90% - green >70% - <90% - yellow <70% - red
E4. Divisions have a process to identify, analyze, and categorize hazards associated with work. Examples of hazard inventory include: <ul style="list-style-type: none"> <li>• HEAR database</li> <li>• project safety review</li> <li>• workspace safety review</li> </ul>	V4. For all Division projects, programs, and operations, have hazards been identified and inventoried? Does inventory include both new work and modification of existing work?	satisfactory - green partial - yellow marginal - red
<b>CONTROL HAZARDS</b>		

EXPECTATION	VALIDATION	RATING
<p>E5. Divisions ensure engineering and other safety controls are in place and maintained. Examples of engineering controls include, but are not limited to:</p> <ul style="list-style-type: none"> <li>• guards</li> <li>• fume hoods</li> <li>• interlocks</li> <li>• personal protective equipment</li> <li>• gas monitors</li> </ul>	<p>V5. Are engineering controls monitored as part of division self-assessment program? Are controls certified/checked, calibrated, and/or serviced within the required schedule?</p>	<p>satisfactory - green partial - yellow marginal - red</p>
<p>E6. Divisions ensure administrative controls are in place and maintained. Examples of administrative controls for self-authorized work include:</p> <ul style="list-style-type: none"> <li>• work procedures</li> <li>• project safety reviews</li> <li>• assurance letters</li> </ul>	<p>V6. Are hazards controlled for all division projects? Are administrative controls reviewed annually and when work is modified? This includes work under formal authorizations (e.g., AHDs, RWAs) and self-authorized work (i.e., Division approval only).</p>	<p>satisfactory - green partial - yellow marginal - red</p>
<p>E7. Divisions ensure that ergonomic issues are effectively addressed for work processes and staff workstations.</p>	<p>V7. Does the Division have an active ergonomic program for its employees, including ergonomic training (i.e., EHS0060, EHS0052, EHS0062), evaluations, and controls for work processes and workstations? Are evaluation recommendations implemented?</p>	<p>satisfactory - green partial - yellow marginal - red</p>

EXPECTATION	VALIDATION	RATING
<b>CONTROL HAZARDS</b>		

<p>E8. Divisions ensure that peroxide-forming chemicals are effectively controlled. Examples of controls include:</p> <ul style="list-style-type: none"> <li>• Locations and owners of peroxide-forming chemicals are identified.</li> <li>• Peroxide-forming chemicals are labeled in accordance with the Chemical Hygiene and Safety Plan.</li> <li>• Peroxide-forming chemicals are tested in accordance with the Chemical Hygiene and Safety Plan.</li> </ul>	<p>V8. Does the division have a program to control peroxide-forming chemicals?</p>	<p>satisfactory - green partial - yellow marginal - red</p>
	<b>PERFORM WORK</b>	
<p>E9. Work is performed within the ES&amp;H conditions and requirements specified by Laboratory policies and procedures.</p>	<p>V9a. Work within authorization:</p> <p style="padding-left: 40px;">% SAA compliance (MWSAAs, RWCAs)</p> <p style="padding-left: 40px;">% Authorization compliance (i.e., RWAs, RWPs, XAs, AHDs)</p> <p style="padding-left: 40px;">% compliance QA waste samples</p> <p style="padding-left: 40px;"># Waste Management–issued NCARs</p>	<p><i>regulatory-driven</i> &gt;90% - green &gt;75% - &lt;90% - yellow &lt;75% - red</p> <p><i>regulatory-driven</i> &gt;90% - green &gt;75% - &lt;90% - yellow &lt;75% - red</p> <p><i>regulatory-driven</i> &gt;95% or only 1 failure - green &gt;92% - &lt;95% - yellow &lt;92% - red</p> <p><i>regulatory-driven</i> 0 - green type 1* - yellow type 2 @ - red</p>

EXPECTATION	VALIDATION	RATING
PERFORM WORK		

	<p>V9b. Injuries and Accidents: Is TRC rate under 2.62 or evidence of divisional improvement?</p> <p>Is LWC rate under 1.50 or evidence of divisional improvement?</p>	<p><i>contract-driven</i> TRC &gt;25% below 2.62 or 20% improvement or 1 case/yr - green TRC &lt;25% below/above 2.62 or 10% improvement or 2 cases/yr - yellow TRC &gt;25% above 2.62 - red</p> <p><i>contract-driven</i> DART &gt;25% below 1.50 or 20% improvement or 1 case/yr - green DART &lt;25% below/above 1.50 or 10% improvement or 2 cases/yr - yellow DART &gt;25% above 1.50 - red</p>
E10. Staff is proficient in performing work safely.	<p>V10a. % completion of JHQs or equivalent system.</p> <p>V10b. Based on JHQs or training profiles, % completion rate for required courses.</p>	<p>&gt;90% - green &gt;80% - &lt;90% - yellow &lt;80% - red</p> <p>&gt;90% - green &gt;80% - &lt;90% - yellow &lt;80% - red</p>
E11. Divisions review at least one research or Operations process. Reviews are documented and, if possible, waste-reduction strategies implemented.	<p>V11. 1) Divisions demonstrate progress in minimization opportunities identified in FY04 self-assessment.</p> <p>2) Divisions review at least one research or operations process. Reviews are documented and, if possible, waste reduction strategies implemented. Divisions include waste minimization in division project review protocols.</p> <p>3) Divisions that generate no regulated waste pursue minimization opportunities for other wastes (paper, batteries, toner, etc.).</p>	<p>satisfactory - green partial - yellow marginal - red</p>

EXPECTATION	VALIDATION	RATING
FEEDBACK AND IMPROVEMENT		
E12. Managers and staff are regularly involved in ES&H feedback and improvement activities.	V12. Do line management (including division directors, principal investigators, and senior/mid managers) and staff participate in feedback and improvement activities (i.e., walk-throughs, programmatic safety review, and other ES&H activities)?	satisfactory - green partial - yellow marginal - red
E13. ES&H deficiencies identified from workspace inspections, self-assessment activities, and external appraisals are corrected in a timely manner. A downward trend of Level 1 and 2 LCATS repeat deficiencies is established.	V13. % completion rate of LCATS corrective actions (Levels 1, 2, and 3) implemented in a timely manner.	>90% - green >80% - <90% - yellow <80% - red
E14. ES&H programmatic deficiencies identified from MESH Reviews, IFAs, and previous Division Self-Assessments are corrected in a timely manner.	V14. % completion rate of programmatic corrective actions identified during MESH Reviews, IFAs, and previous Division Self-Assessment implemented in a timely manner.	>90% - green >80% - <90% - yellow <80% - red
E15. Division performs thorough review of all staff injuries and accidents, including analysis of conditions that led to injury and implementation of corrective actions.	V15. Has the division ensured that accident causes and corrective actions for first aid and recordable injuries are effectively identified on SAARs? Are corrective actions implemented?	satisfactory - green partial - yellow marginal - red



## Appendix B

## FY05 Division Self-Assessment Performance Ratings

Criteria	AFRD	ALS	Chemical Sciences	Computing Sciences	Directorate	EH&S	Engr	Environ. Energy Tech	ESD	Facilities	LSD	MSD	Nuclear Sciences	Phys Biosci.	Physics	Genomics	Expectation Score
Evidence of strong ES&H communication	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	100%
Work planning includes environmental performance reviews	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	100%
% Work space inspected	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	95%	100%	97%	100%	100%
Hazards and environmental impacts identified, analyzed, and categorized	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	100%
Engineering controls in place and maintained	Yes	Yes	100%	100%	Yes	Yes	Yes	Yes	100%	Yes	Yes	Yes	95%	Yes	Yes	Yes	100%
Formal authorized work reviewed annually and when work is modified	Yes	Yes	Yes	N/A	N/A	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	100%
Self-authorized work reviewed annually and when work is modified	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	100%
Ergonomics issues effectively addressed	Yes	Yes	Partial	Yes	Yes	Yes	Partial	Yes	Yes	Yes	Partial	Partial	Yes	Yes	Partial	Yes	89.6%
Chemical inventory maintained	100%	89%	85%	N/A	N/A	89%	85%	90%	95%	100%	93%	94%	93%	100%	100%	100%	100%
Peroxide forming chemicals are controlled	Yes	N/A	Yes	N/A	N/A	Yes	N/A	Yes	Yes	N/A	Yes	Yes	Yes	Yes	N/A	Yes	100%
% Completion of OSHA instances	76%	100%	100%	100%	100%	97%	67%	93%	100%	77%	94%	100%	89%	100%	100%	100%	100%
% SAAs in compliance	75%	91%	91%	N/A	N/A	85%	100%	88%	100%	100%	90%	90%	94%	100%	100%	100%	90.5%
# radiological authorization noncompliances	0	0	0	N/A	N/A	1	N/A	0	2	0	2	0	0	1	0	N/A	88.9%
# environmental violations and unplanned releases	0	0	0	N/A	N/A	0	0	0	0	1	0	0	0	0	0	1	95.2%
% QA compliance rate	100%	95%	100%	N/A	N/A	100%	98%	98%	100%	100%	99%	98%	100%	100%	100%	96%	100%
# NCARs	0	0	0	N/A	N/A	1	0	1	0	1	0	2	1	0	0	0	76.2%
TRC rate	0.00	1.28	1.09	1.13	2.12	1.28	2.00	0.98	1.57	4.71	0.44	1.48	1.06	0.00	0.00	0.71	N/A
DART rate	0.00	1.28	0.00	0.56	0.27	1.28	1.20	0.49	0.00	2.57	0.00	0.00	0.00	0.00	0.00	0.71	N/A
% Job hazard questionnaire (JHQ) completed	93%	100%	93%	92%	95%	94%	99%	95%	93%	91%	93%	92%	96%	96%	93%	93%	100%
% Completion rate of required courses	95%	94%	96%	95%	95%	94%	95%	92%	92%	94%	94%	91%	93%	94%	86%	94%	97.9%
Student safety issues effectively addressed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	N/A	Yes	Yes	Yes	Yes	Yes	Yes	100%
Managers and staff involved in ES&H feedback and improvement	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Partial	97.9%
Workspace safety LCATS completion rate	74%	93%	98%	100%	99%	90%	97%	97%	95%	100%	100%	94%	82%	95%	82%	95%	91.7%
Programmatic LCATS resolved	Yes	Yes	N/A	Partial	Yes	Yes	Yes	Yes	Yes	Partial	Yes	Yes	Yes	Yes	Yes	Yes	95.6%
SAARs properly completed and corrective actions implemented	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	100%
Division Score	94.2%	100%	98.5%	97.8%	100%	94.2%	98.4%	95.7%	98.6%	93.7%	97.1%	95.7%	95.7%	98.6%	95.5%	97.0%	96.7%

## Appendix C

### FY05 Self-Assessment

#### Noteworthy Practices and Opportunities for Improvement

DIVISION	REVIEW	NOTEWORTHY PRACTICES	OPPORTUNITIES FOR IMPROVEMENT
Accelerator and Fusion Research	Division SA	<ul style="list-style-type: none"> <li>Senior management involvement is very strong. The Division Director holds dedicated all-hands safety meetings with each program and sends a strong message to line management and staff of his expectation for safety.</li> <li>The QUEST program is a comprehensive and effective program that utilizes line managers and staff to proactively identify, assess, and control hazards in AFRD workspaces.</li> </ul>	<ul style="list-style-type: none"> <li>SAA compliance was 75% for 2005. 18 of 24 SAAs were compliant during two rounds of inspections.</li> <li>The Division is not completing ES&amp;H deficiencies in a timely manner. Only 74% of LCATS-tracked items were corrected in a timely manner.</li> </ul>
	IFA	<ul style="list-style-type: none"> <li>The Division uses a network of researchers tasked with various levels of ES&amp;H oversight. Each program (AFRD is composed of six distinct experimental programs) has an employee assigned ES&amp;H responsibility as part of the Division's day-to-day monitoring of Division activities.</li> <li>The Superconducting Magnet Test stand in Building 58 has redesigned and built an experimental apparatus that exceeds required guarding and shielding, particularly with respect to mechanical and electrical vulnerabilities. The installed shielding was designed to provide worker protection even as the experiment evolves in the future.</li> <li>The L'Oasis experiment in Building 71 has taken several steps beyond compliance. The interlock system exceeds requirements as well as a number of best practices with respect to electrical guarding and control practices. Examples of these best practices can be seen throughout this experimental area.</li> </ul>	<ul style="list-style-type: none"> <li>AFRD has been very space-challenged. The Division occupies old buildings with numerous roof leaks, falling ceiling tiles, crumbling walls and floors, and groundwater leaks. All findings are being entered into LCATs, and they are attempting to work with facilities to repair these problems.</li> <li>Some of the spaces are cluttered with items that should be identified for disposal. This causes problems due to lack of space, and creates clearance issues for equipment and machinery.</li> <li>There still exist some problems with temporary electrical feeds for fixed equipment.</li> <li>The Division is aggressively mitigating the above-mentioned problems and has shown a serious commitment to continue this effort. The Division has recently committed \$30,000 to clean out B58 and other areas.</li> </ul>

DIVISION	REVIEW	NOTEWORTHY PRACTICES	OPPORTUNITIES FOR IMPROVEMENT
Accelerator and Fusion Research (continued)		<ul style="list-style-type: none"> <li>AFRD leads the Laboratory in compliance in Posted Lockout/Tagout required procedures. All experimental apparatus that have more than one point of hazardous energy control have posted procedures.</li> <li>AFRD leads the Laboratory in posted interlock testing procedures. All AFRD experiments that require these posted interlock procedures are in compliance, and logs of the periodic testing are kept.</li> <li>AFRD does an excellent job of equipment, apparatus, and experiment-specific training. An example is the superconducting magnet testing facility, which gave safety training for all hazards, component by component, from one end of the experiment to the other. This was accomplished during several safety meetings, and all employees were involved as both presenters and trainees.</li> </ul>	
Advanced Light Source	Division SA	<ul style="list-style-type: none"> <li>ALS uses several well-established methods and multilevel forums (from the ALS Director down and from the beamline worker up) to routinely and proactively discuss/resolve ES&amp;H issues.</li> <li>Student researchers are assigned to specific staff to assure that safety work assessments, training, and workplace supervision are effective.</li> <li>ALS is aggressive and comprehensive in accident/injury follow-up with high-level management attention devoted to all cases as well as detailed staff analysis and causal correction.</li> </ul>	
	IFA	<ul style="list-style-type: none"> <li>ALS is very committed to allocating resources to ensure a safe work environment. The Division has safety professionals, which include a full-time EH&amp;S coordinator, a part-time EH&amp;S administrator, and a full-time matrixed Radiological Control Technician (RCT).</li> </ul>	<ul style="list-style-type: none"> <li>The ALS should pay particular attention to safety issues that arise due to overcrowding of the ALS experiment floor. The trip hazards, bump hazards, sharp edges, and narrow passages noted in the IFA have potential to become more serious issues as more</li> </ul>

DIVISION	REVIEW	NOTEWORTHY PRACTICES	OPPORTUNITIES FOR IMPROVEMENT
Advanced Light Source (continued)		<p>The EH&amp;S coordinator and administrator conduct quarterly walk-throughs of all Division space. In addition to the safety professional, the ALS has a team of beamline coordinators who walk the ALS experiment floor daily and coordinate safety inspections of all user experimental equipment.</p> <ul style="list-style-type: none"> <li>ALS has multiple safety review programs, including processes for experiment review, beamline review, the QUEST program, and the radiation safety program. In one way or another, these programs involve all employees of the ALS.</li> <li>The Key Enable procedure is an outstanding process that ensures new and modified beamlines are thoroughly inspected for all safety requirements before being brought online. This process was developed by the ALS. It demonstrates exemplary initiative and goes beyond compliance.</li> </ul>	<p>beamlines and more researchers crowd into the area in the future.</p> <ul style="list-style-type: none"> <li>More effort should be made to keep clear areas for duck and cover.</li> <li>All machine equipment should be inspected and brought up to current standards.</li> </ul>
Chemical Sciences	Division SA	<ul style="list-style-type: none"> <li>The Division has a very effective accident prevention program. The Division Deputy addresses each injury or accident directly. It is a standing topic at the bimonthly meetings of the Deputy, safety coordinator, and liaison. This demonstrates a proactive approach towards accident prevention. For the performance year, the Division had only one recordable injury and no lost time workdays.</li> <li>The Division has a large number of students, most of whom work on campus only. The PIs comply with the safety agreement between LBNL and UCB, and students are obligated to complete UC ES&amp;H training where required. The Division Deputy has a campus meeting for these students. At the meeting, the Deputy explains that a postdoc is always involved where students are working, and that a check-out of procedures is always required.</li> </ul>	<ul style="list-style-type: none"> <li>91% of those required to take EHS0060 have completed the course; however, seven requested evaluations are incomplete for longer than the mandated time. In addition, in the past, the Division has not done evaluations for scientists, and has focused on administrative staff. (They are planning to complete evaluations for theorists.) They have not thoroughly analyzed other potential ergonomic hazards for their work. At the least, a review of their policies in this area would be useful. Though they may not yet have scientists or students with ergonomic injuries, there are examples in the rest of the Laboratory.</li> </ul>
Computing	Division SA	<ul style="list-style-type: none"> <li>Computing Sciences has 94% staff ergo trained for 2005.</li> </ul>	<ul style="list-style-type: none"> <li>Computing Sciences does not have a systematic</li> </ul>

DIVISION	REVIEW	NOTEWORTHY PRACTICES	OPPORTUNITIES FOR IMPROVEMENT
<p>Sciences</p> <p>Computing Sciences (continued)</p>	<p>MESH</p>	<p>Ergo evaluation requests are promptly addressed. Only two requests for evaluation are unfulfilled. &gt;95% of issues identified are resolved quickly and fully. Emerging ergo issues associated with the growing use of “laptop” PCs is a significant challenge for Computing Sciences supervisors.</p> <ul style="list-style-type: none"> <li>• Computing Sciences organizations and work efforts generate very little waste. Waste reduction and resource conservation achievements are recorded in the CS Waste Minimization report.</li> <li>• Computing Sciences senior management proactively relocated all staff out of the seismically inadequate Building 50D, even though office space is at a premium in the Division.</li> <li>• Once the Linux cluster in Bldg. 943 was identified as a potential noise hazard, effort was made to protect hearing.</li> <li>• Procedures for avoiding halon exposure in Building 50B are well implemented.</li> <li>• The Division diligently followed up on a past floor tile lifting injury by purchasing and distributing several “Upright Tile Lifter” tools.</li> <li>• Energized Work Permit Awareness training is required for CS staff working in relevant environments.</li> </ul>	<p>process for identifying and inventorying hazards. Workspace inspections focus on safety deficiencies. However, the Division has no methodology to inventory existing hazards and self-authorize that these hazards are controlled.</p> <ul style="list-style-type: none"> <li>• Computing Sciences should stress required workstation evaluations and a more proactive approach to achieve zero ergo injuries/accidents. The Division had one ergo recordable injury related to extensive use of a laptop in completing a time-dependent project. The 2002 MESH review identified a similar finding.</li> <li>• Computational Research has not been as diligent in pursuing ergonomic evaluations as other Computing Sciences/Directorate divisions.</li> <li>• The hazard analysis process for routine work was not well demonstrated. The semiannual safety review checklists (i.e., group safety checklist and space safety checklist) are outstanding tools for performing hazard review, but they have not been used for the past couple of years. Computing Sciences should begin using these documents again in reviewing and controlling hazards.</li> </ul>
<p>Directorate/ Ops</p>	<p>Division SA</p>	<ul style="list-style-type: none"> <li>• The Division experienced significant changes in 2005. There were management and structural changes to add to the number and geographical diversity of the units, which can make communication difficult. Given these factors, the Division made considerable progress in addressing issues of line management communication.</li> </ul>	

DIVISION	REVIEW	NOTEWORTHY PRACTICES	OPPORTUNITIES FOR IMPROVEMENT
Directorate/ Ops (continued)		<p>A Division Safety Management Executive Committee and a Line Management Committee meet regularly to discuss ES&amp;H issues. All managers (of the various units in the Directorate) were required to coordinate two safety meetings of their staff during the year. Some units also have a “safety minute” at all of their leadership meetings. In addition to ES&amp;H information being delivered and discussed at these meetings, the</p> <p>Coordinator provides “Safety Tips” and “Spot Light on Safety” information, and presents trainings (e.g., how to close out ergonomic evaluations) where appropriate. In addition, the Line Management Committee is responsible for sending e-mails on ES&amp;H topics to Level 1 employees or supervisors. These cover training issues, unresolved ergonomic evaluations, lessons learned, roles, and responsibilities. The Division has made great strides in this area.</p> <ul style="list-style-type: none"> <li>• Only office items are used in these groups, yet the Division made considerable strides in the area of waste minimization and attention to environmental concerns. A flyer was prepared to remind employees to recycle; “green” products are ordered wherever possible; additional can/bottle recycle containers and battery containers were placed in off-site buildings; toner cartridges, transparencies, and diskettes are recycled; the computer “buy back” program was studied, and off-site building issues were addressed. The efforts in this area were noteworthy.</li> <li>• The Division has made significant progress in the ergonomic arena. 93% of the staff completed EHS0060 (this number includes staff who were reassigned to divisions during the year); the Division performed 98 evaluations for CUE-represented staff, and 166 evaluations for non-CUE employees. Many evaluations are in progress, as they are being done for new hires and</li> </ul>	

DIVISION	REVIEW	NOTEWORTHY PRACTICES	OPPORTUNITIES FOR IMPROVEMENT
Directorate/ Ops (continued)	MESH	<p>recent moves. Only two requested evaluations have not been performed, and most recommendations have been implemented. The Coordinator also presented ergonomic information to several different groups, and organized monthly e-mails to the Line Management Committee on unresolved ergonomic items. The Division has taken an aggressive approach to this criterion and accomplished a lot in 2005.</p> <ul style="list-style-type: none"> <li>The MESH team noted significant Directorate/Operations safety management improvements in its 2005 ISM Plan content, clarity and communication; in evaluating, monitoring, and correcting employee workstations; and in finding and fixing workplace safety deficiencies. The team believes these improvements are largely due to the decisive actions made by the Directorate/Operations in chartering a strong safety committee, hiring a dedicated safety program administrator, and clarifying the functions of each.</li> </ul>	<ul style="list-style-type: none"> <li>The Directorate/Operations has made considerable efforts to improve safety supervision and resource responsibilities for matrixed staff and their workspaces. However, much more progress is needed to correct the many complex safety issues surrounding matrixed staff.</li> </ul>
Earth Sciences	Division SA	<ul style="list-style-type: none"> <li>ES&amp;H is the first agenda item at quarterly town-hall meetings and a standing agenda item at weekly Division and department/group meetings. Safety Committee meets monthly; Division Director attends quarterly. In addition to these safety discussions, lessons learned and other ES&amp;H issues are communicated by Level 1 e-mails. "Health and Safety at a Glance" posters are displayed in all work areas, and are included in the new employee packet. The ES&amp;H Web site is maintained and contains all ESD policies, procedures, links to resources, and the ISM plan. Daily tailgate safety meetings are held for fieldwork.</li> <li>100% of workspace was inspected twice during semiannual management walk-throughs using ISM walk-through checklists. Division Director and department heads accompanied the Division Safety Coordinator and</li> </ul>	<ul style="list-style-type: none"> <li>ESD received 2 radiological authorization Level 2 noncompliances. Violation of RWA #1107 involved unauthorized work with radioactive material without required escort form. Violation of RWA #1016 involved the use of facilities for radiological work not authorized in the RWA.</li> </ul>

DIVISION	REVIEW	NOTEWORTHY PRACTICES	OPPORTUNITIES FOR IMPROVEMENT
Earth Sciences (continued)	IFA	<p>EH&amp;S Liaison. 100% ESD lab space inspected by EH&amp;S electrical experts.</p> <ul style="list-style-type: none"> <li>Chemical inventory is tracked using the Chemical Management System (CMS) database. Lab-space lead PIs review all new work in their labs for hazards. Each lab maintains a Laboratory Safety Primer binder that identifies lab-specific hazards and controls.</li> <li>All students complete the Job Hazards Questionnaire (JHQ) with their supervisor/mentor, and do not work unsupervised until training has been completed. Student mentors took EHS0024 or received a copy of notes.</li> </ul> <p>Students are required to follow ISM and receive the “Health and Safety at a Glance” in their new employee packets.</p> <ul style="list-style-type: none"> <li>The lab PI in 70-4459 promoted the Lab Safety Primer and glove selection chart to the IFA team, emphasizing commitment to safety. All ESD Labs have Lab Safety Primers.</li> <li>Management walk-throughs are personally led by the ESD Director, while the ESD safety coordinator, group leaders, and department heads also attend. The walk-throughs are an effective method for line management review of Division space and promoting workplace safety.</li> <li>Given the matrix nature of ESD, each lab space has a designated lead PI who is responsible for identifying lab hazards, and notifying others working in the lab space about the hazards. This designation system was developed by the Division, which also includes the creation of customized lab entry signs to clearly identify who has primary responsibility for the space.</li> </ul>	<ul style="list-style-type: none"> <li>Increased vigilance is warranted in the areas of seismic safety, office ergonomics for students, housekeeping, and machine guarding/safety.</li> </ul>
Engineering	Division SA	<ul style="list-style-type: none"> <li>The Hazards, Equipment, and Authorizations Review (HEAR) System is utilized in the Division for its space.</li> </ul>	<ul style="list-style-type: none"> <li>94% of required staff has completed EHS0060. Five requested ergonomic evaluations remain unresolved.</li> </ul>

DIVISION	REVIEW	NOTEWORTHY PRACTICES	OPPORTUNITIES FOR IMPROVEMENT
Engineering (continued)		<p>Updating the hazards inventory information was successful; the inventory was coupled to the self-assessment schedule to achieve 100% review updating by occupants for all Engineering space.</p> <ul style="list-style-type: none"> <li>Requirements of personal protective equipment use are posted. Supplemental equipment (hearing protection, eye protection, head protection, hand protection, etc.) is readily available. EH&amp;S Division Industrial Hygiene personnel certify/check fume hoods, air ventilation systems, bio-cabinets, and glove boxes as required. Monitors (toxic and flammable gas, stack emission, ventilators, oxygen deficiency, and etc.) are being calibrated and serviced per the current EH&amp;S schedule.</li> </ul> <p>These items are routinely inspected during the Self-Assessment to verify updated inspection tags/stickers.</p> <ul style="list-style-type: none"> <li>The Engineering Division worked with its EH&amp;S assigned liaison to bring in a machine guarding consultant to provide guidance in insuring the Laboratory meets the standards. The consultant provided a full report. Requisitions have been submitted to vendors for the modification/retrofit work that commenced in August 2005.</li> <li>The Engineering Division Safety Coordinator solicited the expertise of its Electronics Photo-fabrication main operator to review and utilize the Chemical Management System (CMS) peroxide forming criteria, and to review all Engineering system-inventoried chemicals, to insure the identification of chemical owners. This effort provides future assurance that the Division can monitor its chemicals for peroxide formers.</li> <li>The Division Director performs walk-throughs on most of the Engineering spaces and encourages managers to do the same. Division deputies, senior managers, PIs, and supervisors are routinely out in the field, reviewing</li> </ul>	

DIVISION	REVIEW	NOTEWORTHY PRACTICES	OPPORTUNITIES FOR IMPROVEMENT
		<p>work, work activities, and general safety.</p> <ul style="list-style-type: none"> <li>The inclusion of division deputies in accident investigations of their staff is an opportunity for them, the affected employee, and the supervisor to engage in feedback and improvement opportunities.</li> </ul>	
EETD  EETD (continued)	Division SA	<ul style="list-style-type: none"> <li>The Division Safety Coordinator sends a quarterly safety newsletter to all Division staff. In addition, the weekly electronic newsletter, "What's New in EETD," frequently includes safety topics.</li> <li>ES&amp;H considerations are integrated into work planning. EETD has one of the most robust forms of ES&amp;H communication at the Laboratory. Staffs are engaged through multiple approaches, including electronic newsletters, committee meetings, management communications, safety coordinator communications, and an ES&amp;H Web page.</li> <li>EETD has a redundant and effective system for performing workspace inspections and inventorying hazards.</li> <li>EETD has a very proactive ergonomic safety program that includes much more aggressive ergonomic evaluation requirements than those required by LBNL.</li> <li>EETD has outstanding hazard control systems. Several noteworthy practices are employed: the process to complete the self-assessment checklists ensures that PIs inspect workspaces, inventory all hazards, and consider appropriate hazard controls. The Division's hazard-control processes are well organized, as formal authorizations and peroxide formers are inventoried with appropriate dates listed. This creates an easy check for remaining in compliance with applicable requirements.</li> <li>Line managers, principal investigators, and group</li> </ul>	<ul style="list-style-type: none"> <li>The Division achieved compliance in only 44 out of 50 SAAs (88%) from two rounds of inspections.</li> <li>One NCAR for improper disposal of CA-regulated waste was cited during the performance year.</li> </ul>

DIVISION	REVIEW	NOTEWORTHY PRACTICES	OPPORTUNITIES FOR IMPROVEMENT
		leaders participate in self-assessment inspections. The Division Director led four safety inspections of Division workspaces.	
EH&S	Division SA	<ul style="list-style-type: none"> <li>The Division held two all-hands meetings with internal, Division-wide ES&amp;H as an agenda item. Each group in the Division also includes safety as a standing item. There is an expectation that group leaders discuss safety one-on-one with their staff. The Division Safety Committee meets monthly and covers a wide range of items, both internal to the Division and relating to their Laboratory function. The ISM plan identifies roles and responsibilities.</li> <li>The Division inspected 100% of its workspace using three different methods: the Self-Assessment Team inspects workspace; group leaders are responsible for annually inspecting their space, and the Division Director and coordinator also do walk-throughs.</li> </ul> <p>Documentation from the Self-Assessment Team Checklist validating group performance is very good.</p>	<ul style="list-style-type: none"> <li>85% of SAAs (11 out of 13) were in compliance.</li> <li>A Level 2 EH&amp;S violation of RWA 1009 for "Incorrect Procurement of Radioactive Material" occurred on 01/13/05.</li> <li>The Division received one NCAR for waste stored in an SAA for more than one year.</li> </ul>
EH&S (continued)	MESH	<ul style="list-style-type: none"> <li>Several different EH&amp;S safety group meeting minutes contained the full history of action items, at the level of approximately one line of information per topic, per meeting. This is a useful way to track the progress of action items from start to completion.</li> <li>A new group leader attended classes offered by his group to the rest of the Laboratory. This is a good way to inform himself of the existing safety regulations and safety education taught at Berkeley Lab, and to look for areas of improvement.</li> <li>Division management is attempting to centralize occurrence reporting so all stakeholders can capture the status of the Laboratory on a daily basis. A full system that satisfies the requirements of approximately nine</li> </ul>	<ul style="list-style-type: none"> <li>Managers are not exercising sufficient scrutiny in reviewing incident reports for completeness and accuracy.</li> </ul>

DIVISION	REVIEW	NOTEWORTHY PRACTICES	OPPORTUNITIES FOR IMPROVEMENT
		<p>different reporting agencies is a noteworthy effort.</p> <ul style="list-style-type: none"> <li>Since the last MESH review, there were three radioactive contamination incidents in the Hazardous Waste Handling Facility (HWHF). These problems were fixed by a combination of reassigning existing experts within the Division to the HWHF to restore core competencies, and by disciplinary action. These actions seemed to have improved the work safety environment.</li> </ul>	
Facilities	Division SA	<ul style="list-style-type: none"> <li>EH&amp;S issues are regularly communicated to all staff via a variety of methods. Each department has regular all-hands meetings that include safety discussion. The Division has four safety committees: an executive safety committee, and one for each of the three departments. Safety committees communicate important issues to their groups. The Division also had an all-hands safety stand-down this performance year. Communications also occur through Workers Observing Workers (WOW) steering and observer meetings, craft safety meetings, e-mails, newsletters, and bulletin boards.</li> </ul>	<ul style="list-style-type: none"> <li>Findings from previous self-assessment year were not tracked in LCATS. In addition, not all findings were fully resolved.</li> <li>Facilities had one NCAR: the SAA to store broken glass from fluorescent bulbs had waste over one year in storage.</li> <li>Facilities had one release above the regulatory threshold: an 11-liter PCB spill on November 1, 2004.</li> </ul>
Facilities (continued)		<ul style="list-style-type: none"> <li>Facilities has done an admirable job of improving their hazard identification process. Its inspection system, which includes inspections by senior and line managers, the Division Safety Coordinator, and the EH&amp;S liaison, covers all areas multiple times. All hazards are inventoried during the safety coordinator inspections.</li> <li>Self-authorized work is reviewed annually. This is documented in the HEAR database. In addition, through Maximo, all large work orders list the hazards in each work location. Plant Operations/Technical Services has developed hazard evaluation procedures for smaller jobs. Other forms include the task hazard analysis and ZAP form for completing small jobs requested through the work request center.</li> <li>Facilities feedback and improvement methodology has</li> </ul>	

DIVISION	REVIEW	NOTEWORTHY PRACTICES	OPPORTUNITIES FOR IMPROVEMENT
	IFA	<p>improved in recent years. The ARB form created by the Division Safety Coordinator is a noteworthy practice.</p> <ul style="list-style-type: none"> <li>Ergonomic improvements to B79 Metals Storage Facility, B78 Central Receiving, and B31 Labor Shop Storage Sheds are exemplary.</li> <li>Storage and housekeeping in B31 Labor Shop storage sheds and B51 rigger's trailer are noteworthy. There are also excellent housekeeping in B82-100, and excellent tool storage in B76-234 Carpentry Shop/HerSafe router.</li> <li>Readily accessible personal protective equipment (PPE) in B90-0027 mechanical room (hearing protection) and B76-105 Vacuum Pump Shop (safety glasses) promotes regular usage of PPE.</li> <li>Facilities exhibited proactive injury prevention in the B54-098 mechanical room under Perseverance Hall by padding several bump hazards.</li> <li>The installation of the drum-dispensing equipment in the B81-100 water tower chemical supply building is noteworthy.</li> </ul>	<ul style="list-style-type: none"> <li>Many electrical deficiencies (32) were noted, despite numerous, previous electrical inspections.</li> <li>Machine guarding of fans and other HVAC components is incomplete, and openings wide enough to allow fingers and/or hands to pass through still exist.</li> <li>Several issues regarding sanitary conditions in the cafeteria were observed.</li> <li>Instances of broken or improperly stored PPE were found.</li> <li>Construction debris left behind by contractors were found in several mechanical rooms.</li> </ul>

DIVISION	REVIEW	NOTEWORTHY PRACTICES	OPPORTUNITIES FOR IMPROVEMENT
Life Sciences	Division SA	<ul style="list-style-type: none"> <li>The Division Safety Committee met four times during the course of the year. All groups are represented on the committee. Committee representatives are required to communicate issues back to their groups and bring group concerns to committee meetings. This is required in the committee charter.</li> <li>The Division is pursuing the purchase of two imaging devices that would employ non-radioactive imaging techniques and eliminate the need for photochemicals. This is a noteworthy practice that will reduce mixed waste generation.</li> <li>Line management is involved through regular communication of senior managers, safety committee membership, and completing the space hazards inspection records. Senior and line managers also inspect staff workspaces throughout the year.</li> </ul>	<ul style="list-style-type: none"> <li>The Division does not use the institutional hazard inventory database (HEAR), which leaves this database deficient in listing all hazards across the institution. This impacts other institutional programs, such as Maximo, which means that Facilities workers are not aware of all hazards when they perform work in LSD workspaces. LSD should work with the EH&amp;S Division to effectively and efficiently update the HEAR database using the data provided in the LSD Space Hazards database.</li> <li>Engineering controls are checked during the process of updating the Space Hazards inspection records. However, these inspection sheets do not explicitly list checking engineering controls as a function of these inspections. Rather, engineering controls are listed in the notes section. A more systematic approach is that engineering controls should be better integrated into these inspection records.</li> <li>83% of required staff have completed EHS0060.</li> <li>LSD had 2 RWA violations during the performance year.</li> </ul>
	MESH	<ul style="list-style-type: none"> <li>The Division's planning for the new Potter Street Laboratory facility has resulted in state-of-the-art laboratories with well-equipped safety features in place. The fume hoods, emergency showers/eyewashes, seismic restraints, and chemical storage cabinets are all new or in excellent condition. The design of the facility provides for a safe and environmentally responsible work environment for employees and guests.</li> <li>The bulletin boards and lab signage provided important safety information to employees, including future dates for Division-specific safety training. The employees and students working in the facility are knowledgeable of</li> </ul>	<ul style="list-style-type: none"> <li>The current version of Life Sciences' ISM plan does not specifically address student safety. Given that the Division has a large student population and that an incident occurred with a student in LSD space (Donner Lab), the Division should be more explicit in their plans for student safety.</li> <li>Although the Division has expanded both in terms of funding and space, it has not planned for additional resources for its ES&amp;H program. Division management should provide a backup for the Coordinator in case of his absence from work, and should consider reallocating some of the</li> </ul>

DIVISION	REVIEW	NOTEWORTHY PRACTICES	OPPORTUNITIES FOR IMPROVEMENT
Life Sciences (continued)		<p>safety policies and training requirements.</p> <ul style="list-style-type: none"> <li>The Division does an excellent job of communicating safety to its employees and guests. The Division utilizes postings, e-mails, group meetings, and Division-specific training to promote safety at the benchtop level. The posted safety mini-minutes and schedules for customized ES&amp;H training are particularly noteworthy, and are models for other divisions to develop.</li> <li>Over the years, Life Sciences has maintained an excellent safety record. For the past fiscal year, the Division has had only two recordable injuries; a high completion rate (93%) for required ES&amp;H training; 95% compliance rate for SAA waste storage, decreasing hazardous waste generation; and only two major RWA violations. Given the large number of laboratories working with hazardous materials or high-risk equipment and the frequent turnover of employees and guests, Life Sciences has done an excellent job of performing work safely.</li> <li>The Division is proactive in providing customized training for its staff/students to address its high and seasonal student turnover. Multiple sessions are made available to the staff to fit their schedules. The training is conducted at the work site by the Safety Coordinator.</li> </ul>	<p>Coordinator's responsibilities to other staff. Increased sharing of ES&amp;H responsibilities with others will also enhance the Division's Integrated Safety Management.</p> <ul style="list-style-type: none"> <li>Given that the Division has approximately 580 employees and guests who come and go on a regular basis in multiple locations, the number of ergonomic evaluations appears to be inordinately low.</li> <li>Donner Laboratory facility (Building 1) was generally lacking in seismic restraints for heavy lab equipment, refrigerators, storage shelves, and file cabinets. With Donner Lab as the primary example, there does not appear to be a systematic approach by the Division for identifying earthquake hazards and assuring that seismic controls are in place.</li> <li>The state of safety at the Donner Laboratory appears to be poor. In addition to the seismic deficiencies described above, the laboratories at Donner had deficiencies in chemical inventory and storage, personal protective equipment, waste management, and radiation protection.</li> <li>The Division's self-assessment inspections of Donner Lab are not effective. In spite of numerous inspections this year by the Division, including a walk-through by the Division Director, safety deficiencies are apparently not being noted.</li> </ul>
Materials Sciences	Division SA	<ul style="list-style-type: none"> <li>MSD uses PI assurances and JHQs to assess hazards for continuing and new work assignments. Project safety reviews are also a form of self-authorization.</li> </ul>	<ul style="list-style-type: none"> <li>Materials Sciences has 84% of required staff ergo trained for 2005. Four requested ergo evaluation requests remain unfulfilled. Recommendations from one evaluation are not implemented.</li> <li>MSD was cited with two NCARs.</li> </ul>

DIVISION	REVIEW	NOTEWORTHY PRACTICES	OPPORTUNITIES FOR IMPROVEMENT
Nuclear Science	Division SA	<ul style="list-style-type: none"> <li>The Division has two ES&amp;H committees. One is a Division-wide committee to address broad issues or policies. The 88-Inch Cyclotron also has a committee. These committees meet on a quarterly basis. A representative from the 88-Inch Cyclotron sits on the Division-wide committee. Minutes are being posted on the Web site, and each member of the committee is expected to bring relevant information to their respective groups. The committee has met quarterly.</li> <li>The 88-Inch Cyclotron ES&amp;H Committee met twice. The 88-Inch Cyclotron also held several all-hands meetings, including one dedicated to electrical safety, in PY05.</li> <li>The GRETINA project was extensively reviewed, and will generate no waste. In addition, the machine shop in the 88-Inch Cyclotron uses washable rags; instead of 1-1-1 trichloroethane, isopropyl alcohol is now used for cleaning; toner, discs, and transparencies are recycled; recycled products are ordered for office use whenever possible.</li> <li>The Division ISM plan indicates that students are covered by all the same policies and procedures that cover employees and other guests. Students complete JHQs and required training classes; however, to augment these activities, the Division will hold a special student orientation meeting early in the fall semester, and is developing appropriate handout material.</li> <li>Managers (including the Division Director) and staff participate in a number of assessment activities. They sit on both of the Division ES&amp;H committees, carry out both formal and informal inspections and reviews, communicate directly with EH&amp;S Division specialists to address ES&amp;H issues for their projects, and identify problems and corrective actions.</li> </ul>	<ul style="list-style-type: none"> <li>The Division received one NCAR for waste kept for over a year. Corrective actions have been taken.</li> <li>There were no Level 1 or 2 deficiencies found in FY05. LCATS was used to track deficiencies found in the OSHA, Self-Assessment, and IFA inspections.</li> </ul>
Nuclear Science (continued)			

DIVISION	REVIEW	NOTEWORTHY PRACTICES	OPPORTUNITIES FOR IMPROVEMENT
Nuclear Science (continued)	IFA	<ul style="list-style-type: none"> <li>• NSD demonstrated good use of project/facility safety review questionnaires and electrical hazard risk analyses for the IceCube Project.</li> <li>• NSD has made a commitment to invest in ergonomic furniture and accessories for most offices.</li> <li>• The Division has maintained excellent housekeeping in Building 70 labs and Building 88's shop, east alley niches, Cave 1, and Cave 4A.</li> <li>• The Division is proactive in its seismic hazard abatement in the Building 51 workspace.</li> <li>• There is excellent use of on-the-job-training (OJT) checklists for staff authorized to work under AHD 2068.</li> <li>• The up-to-date emergency response guides posted prominently in Building 88 are models for other Laboratory buildings.</li> </ul>	<ul style="list-style-type: none"> <li>• The 88-Inch Cyclotron Safety Analysis Document should be reviewed and, if necessary, updated to reflect current operating conditions and regulatory requirements.</li> <li>• For the appropriate AHDs, principal investigators should document completion of OJT using checklists maintained in a binder.</li> <li>• The HEAR database should be used to document projects, perhaps by room number, for which project/facility safety review questionnaires are completed.</li> <li>• Building 88 managers should consider instituting periodic electrical inspections by the building's electrical staff. Electrical problems identified during these self-audits should be resolved as quickly as possible.</li> </ul>
Physical Biosciences	Division SA	<ul style="list-style-type: none"> <li>• The Division has a strong ES&amp;H infrastructure that includes many avenues of communication between management and staff. There is an active Safety Planning Team in addition to an ES&amp;H Committee with wide representation and frequent meetings. The Division Director receives regular reports during the year; the ES&amp;H Coordinator meets individually with PIs; PIs deliver ES&amp;H information in group meetings, and everyone is involved in self-assessment.</li> <li>• The Division has an outstanding and comprehensive ES&amp;H program that is a model of ISM. The Planning Team, Coordinator, and ES&amp;H Committee continually review essential issues and introduce creative activities and procedures to insure that all aspects of ES&amp;H are integrated into the Division's research activities. Noteworthy are the triannual reports to the Division</li> </ul>	<ul style="list-style-type: none"> <li>• The Division received one Level 2 radiological authorization noncompliance report. Corrective action was taken.</li> </ul>

DIVISION	REVIEW	NOTEWORTHY PRACTICES	OPPORTUNITIES FOR IMPROVEMENT
		<p>Director, and the formalized annual meeting with each PL.</p> <ul style="list-style-type: none"> <li>100% of workspaces were inspected. The Division has an excellent three-part system that includes all-hands inspections.</li> </ul>	
Physical Biosciences (continued)		<ul style="list-style-type: none"> <li>The Division has an excellent ergonomics program. 94% of employees who are required to take EHS0060 have completed the course. Five additional staff have been trained as evaluators. Significant resources have been expended (~\$8,000) to remedy poor ergonomic configurations. Moreover, the Division planned for the Potter Street move, and creatively awarded ergonomic accessories at the annual self-assessment picnic. The topic is regularly discussed at ES&amp;H Committee meetings. Overall, the Division has a dynamic and effective program.</li> <li>Students are a significant part of the Division's workforce, and they work in LBNL spaces on site and on campus. The safety officer in each group meets individually with incoming students to complete the JHQ; safety officers meet together monthly. Students also receive on-the-job training on equipment and procedures. Systematic records are kept in "Black Books." The Division is willing to deny access until training is complete.</li> <li>The Division's commitment to improvement is demonstrated by the consistently excellent results achieved in ES&amp;H each year. The Division does not just meet the minimum criteria but strives for excellence, adding procedures and activities each year to enhance their program. The noteworthy practices are many, and the scope of the program goes well beyond the specific set of criteria addressed here. Overall, an exemplary program.</li> </ul>	
Physics	Division SA	<ul style="list-style-type: none"> <li>The Division continues its practice of holding annual</li> </ul>	<ul style="list-style-type: none"> <li>70% of Division staff has completed EHS0060. This</li> </ul>

DIVISION	REVIEW	NOTEWORTHY PRACTICES	OPPORTUNITIES FOR IMPROVEMENT
Physics (continued)		<p>mandatory all-hands ES&amp;H meetings. ISM is addressed at this meeting. In addition, a status report is given on ES&amp;H performance, including areas of concern and opportunities for improvement. Information is also communicated at group leader meetings, Physics Management Meetings (PMM), project meetings, heads' and leaders' meetings, and group assistants' meetings where appropriate. A special student orientation meeting was added in PY05.</p> <ul style="list-style-type: none"> <li>The Project Safety Review Questionnaire used by Physics has always included a question about potential damage to the environment. Noteworthy efforts are as follows: <ul style="list-style-type: none"> <li>Only the minimum amount of chemicals necessary for the currently active job is ordered.</li> <li>All-parts cleaning is accomplished with soap, water, and ultrasonic tank; high-quality cleaning takes place in the plating shop.</li> <li>Solvents are only used in small quantities, and with disposable wipes.</li> <li>Accumulation of waste solvents has been eliminated in one major project.</li> <li>Toner, discs, and transparencies are recycled.</li> <li>Recycled products are ordered for office supplies where possible.</li> <li>Computers are replaced or upgraded before they become e-waste.</li> </ul> </li> <li>Student safety is very important to the Physics Division. As noted in the ISM plan, all Division policies and procedures apply to students. The ES&amp;H Committee also recommends special policies; for example, students are expected to attend safety classes rather than complete courses on line, which is sometimes difficult to arrange due to students' schedules.) Also, as outlined in the ISM, it is expected that line managers (group and project leaders in the Physics Division) carry out</li> </ul>	<p>is down from 87% last year. All staff who requested evaluations have received them. Corrective actions identified from three evaluations are not fully implemented.</p> <ul style="list-style-type: none"> <li>Course completion rate is 86%. The classes most people need are New Employee Orientation and Ergonomics. Physics will have a special Ergonomics class this year.</li> <li>82% completion rate for LCATS. All deficiencies found during OSHA and self-assessment inspections have been recorded. Correction of items from previous years has been verified. There were no Level 1 or 2 deficiencies.</li> </ul>

DIVISION	REVIEW	NOTEWORTHY PRACTICES	OPPORTUNITIES FOR IMPROVEMENT
		<p>required hazard communication and on-the-job-training, and appropriate oversight for students. As an example, safety shoes and back-care training were provided on an urgent basis for students who were on assignment at Los Alamos. This is a potential high-risk group, however, so the Committee also supported a special student orientation meeting.</p>	
Genomics	<p>Division SA</p> <p>MESH</p>	<ul style="list-style-type: none"> <li>The Division performed analysis on a waste stream and determined that it is nonhazardous. This reduced 300 gallons per year of potential hazardous waste. For FY06, the JGI will promote the “buy recycled” program.</li> <li>100% of Division workspace is inspected. The Division Safety Coordinator performed walk-throughs on all workspaces with the responsible manager, and documented all safety deficiencies and hazards in “Safety Walk-through and HEAR Database Update” forms. This information is tracked in LCATS and the HEAR database, as appropriate.</li> <li>Senior Division management, including the Division Director and Division Deputy, also inspect staff workspaces.</li> <li>The process of completing the Safety Walk-through and HEAR Database Update forms ensures that all hazards are inventoried. The HEAR database is updated to reflect the most current conditions.</li> <li>Self-authorized work is reviewed through the HEAR update process. Also, the Division conducts a hazard assessment when creating standard operating procedures (SOPs). SOP implementation includes training.</li> <li>The weekly safety updates at JGI management meetings were identified by several people in interviews as</li> </ul>	<ul style="list-style-type: none"> <li>Genomics considers safety is defining their work. Although ES&amp;H communications occur between management and staff, the mechanism could be more systematic. A suggestion for improving this process includes creating a charter for the Division Safety Committee, with defined roles and responsibilities for members. This should include an explicit responsibility for representatives to communicate relevant safety issues between their respective groups and the Committee.</li> <li>One Notice of Violation was received on October 28, 2004, for a waste storage violation from the Central Contra Costa Sanitary District.</li> <li>Managers participate in annual safety walk-throughs with the Division Safety Coordinator. A suggested improvement is that the Division ISM plan could formalize the safety responsibilities of line managers to increase awareness of workspace safety hazards. Many managers do not consider workspace safety hazards except during routine walk-throughs.</li> <li>Safety improvements are ad hoc. The mechanism for implementing safety improvements is not well established.</li> <li>A recommended improvement is the establishment of a formal safety program that integrates the three</li> </ul>

DIVISION	REVIEW	NOTEWORTHY PRACTICES	OPPORTUNITIES FOR IMPROVEMENT
Genomics (continued)		<p>effective means to ensure the flowdown of safety information to employees, and ensure consistency. By including safety in each meeting, a clear communication of management priority for safety is communicated.</p> <ul style="list-style-type: none"> <li>Operating procedures at JGI have excellent discussions of the safety aspects of the task to be performed, including the hazard and hazard controls. Employees were familiar and confident in these procedures.</li> <li>As the MESH review was being conducted, the Genomics Division was finalizing plans for an operational ergonomics review of Building 100. This is a very proactive step to identify potential ergonomic problems with routine work assignments so that work can be redesigned to reduce the risk to employees.</li> <li>Eyewashes are tested weekly, and during safety meetings, employees were shown how to activate these devices. Frequent testing ensures this vital equipment will be available when needed, and the practical demonstrations ensure employees will be familiar with the equipment.</li> </ul>	<p>buildings occupied by the Genomics Division (i.e., buildings 100 and 400 at Walnut Creek, and Building 84 at LBNL). In addition, most employees work for LBNL and are familiar with LBNL safety programs; however, some employees work for LLNL and are not familiar with LBNL safety programs. The MESH review committee was concerned that the differences between the three buildings' safety programs could impede future improvements and confuse workers.</p> <ul style="list-style-type: none"> <li>The Genomics Division must ensure that LBNL safety procedures are understood and followed by employees and subcontractors. The AHD that was reviewed did not include all required signatures, and the management team did not seem to understand the AHD process adequately. In addition, an issue concerning the use of a lockout/tagout procedure in the construction area of Building 400 arose during the MESH review, and resulted in LBNL procedures not being followed. The supervisor of the work in question was a facility supervisor. The issue was resolved promptly and correctly.</li> <li>While ergonomic controls are specified in the Ergonomic Database, the MESH review team found that employees were not adhering to the ergonomic controls. A variety of reasons, including convenience, was presented. The JGI experienced one ergonomic OSHA recordable injury in FY05. More emphasis on ergonomic safety is needed to ensure compliance with hazard controls and to communicate effectively with employees.</li> <li>During the MESH review, it was reported that not all ergonomic findings are being reported and tracked in the Ergonomic Database. This lack of tracking is contrary to LBNL procedures and may inhibit the ability of the organization to perform injury/illness</li> </ul>

DIVISION	REVIEW	NOTEWORTHY PRACTICES	OPPORTUNITIES FOR IMPROVEMENT
Genomics (continued)			<p>analysis and trending to prevent future injuries.</p> <ul style="list-style-type: none"><li>• While the Genomics Division reported a 98% completion rate for Job Hazards Questionnaires, most employees who needed first-aid training were delinquent, and there was no documentation of OJT. Genomics should provide first-aid training for employees required to perform first aid, and develop a formal OJT program. In addition, there were numerous cases where employees had been waived from the training requirement for PGF-10, "Introduction to Environment, Safety, and Health." The MESH Review team felt this was too widespread,<p>and the orientation to the organization should be nearly universal, with very few waivers. Workplace inspections performed by the MESH review team found chemical hygiene problems in Building 400. Specifically, personnel were observed working with hazardous chemicals without the use of proper PPE. In addition, incompatible chemicals were stored in close proximity on shelves. Food was also observed.</p></li></ul>

## Appendix D

### List of Acronyms and Abbreviations

AFRD	Accelerator and Fusion Research Division
AHD	Activity Hazard Document
ALS	Advanced Light Source
BBAP	Behavior-Based Accident Prevention
CATS	Corrective Action Tracking System
CEQA	California Environmental Quality Act
CSD	Chemical Sciences Division
DART	Days Away from work and Restricted Time
DOE	Department of Energy (U.S.)
EETD	Environmental Energy Technologies Division
EH&S	Environment, Health, and Safety Division (LBNL)
ESD	Earth Sciences Division
ES&H	Environment, Safety, and Health (DOE term)
FY	Fiscal Year
GRETINA	Gamma-Ray Energy-Tracking In-beam Nuclear Array
HEAR	Hazards, Equipment, Authorizations, and Review System
HWHF	Hazardous Waste Handling Facility
IFA	Integrated Functional Appraisal
ISM	Integrated Safety Management
JHQ	Job Hazards Questionnaire
LBNL	Lawrence Berkeley National Laboratory
LCATS	Laboratory Corrective Action Tracking System
LLNL	Lawrence Livermore National Laboratory
L'OASIS	Lasers, Optical Accelerator Systems Integrated Studies
LOTO	Lockout/Tagout
LSD	Life Sciences Division
LWC	Lost Workday Cases
MESH	Management of ES&H
MOU	Memorandum of Understanding
MSD	Materials Sciences Division
MWSAA	Mixed Waste Satellite Accumulation Area
NCAR	Nonconformance and Corrective Action Report
NEPA	National Environmental Policy Act
NFPA	National Fire Protection Association
NSD	Nuclear Science Division
OCA	Office of Contract Assurance
OJT	On-the-Job Training

ORPS	Occurrence Reporting and Processing System
OSHA	Occupational Safety and Health Administration
OSSEP	Off-Site Safety and Environmental Protection Plan
PBD	Physical Biosciences Division
POCMs	Performance Objectives, Criteria, and Measurements
PI	Principal Investigator
PPE	Personal Protective Equipment
PY	Performance Year
QUEST	Quality Assurance/Improvement and Environment, Safety, and Health through Self-Assessment and Teamwork
RWA	Radiological Work Authorization
RWCAR	Radioactive Waste Collection Area
RWP	Radiological Work Permit
SAA	Satellite Accumulation Area
SAAR	Supervisor Accident Analysis Report
SRC	Safety Review Committee
SSA	Sealed Source Authorization
TRC	Total Reportable Cases
UCB	University of California at Berkeley
UCOP	University of California Office of the President
WOW	Workers Observing Workers
XSD	X-Ray Machine Safety Document